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THE
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COST AND VALUE OF SERVICE IN RAIL-
ROAD RATE-MAKING

SUMMARY

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THE main concepts in the theory of railroad rates are fairly well established, but the relative importance of these concepts is a matter demanding further investigation. It is a commonplace to say that cost of service and value of service should be considered in the making of rates; but if the theory of rates is to be put to the best practical use, we should be in a position to say how much of a given rate represents cost of service and how much value of service. This phase of the subject of rates is to be considered in the present article.

I

GENERAL VIEWPOINT

It is customary among German writers to begin the discussion of the principles governing the making of railroad rates by mentioning various possible general

viewpoints.¹ Thus, transportation might be made free, just as the use of the streets is free. This obviously would be inequitable and wasteful. Secondly, a fee might be charged to cover a part of the expense of operation, the remaining expenses, taxes, and interest being met from the proceeds of taxation. This would encourage the widest possible use of the transportation system, would prevent the transportation which is entirely useless from the public standpoint and would make unnecessary an elaborate classification of traffic such as we now know. Thirdly, we have the operation of a road as a public enterprise, the aim being to cover all costs (including return upon capital) but with public service as the dominant motive, and fourthly, there is the private undertaking with a maximum profit as the dominant motive.

It has been asserted that there is no difference between the third and fourth types of administration, since private ownership is nowadays accompanied by government control which curbs the desire for profit and compels a regard for the public interest. This is not the place to enter into the question whether the public interest is on the whole better served by public ownership and operation or by publicly controlled private ownership and operation; but it seems clear that the ideal rate system that should be enforced by representatives of the public is the same in both cases. There can be no dispute as to the result to be achieved, which is to promote the widest use of the railroad at the lowest cost with due regard for the prevention of waste. The total amount of revenue to be contributed by the entire traffic should be sufficient to cover operating expenses, taxes, rents and a

¹ For example, Ulrich, Franz, *Das Eisenbahntarifwesen*, Berlin und Leipzig, 1886, pp. 18-26; and Cauer, Wilhelm, *Betrieb und Verkehr der Preussischen Staatsbahnen*, Zweiter Teil, Personen und Güterverkehr der vereinigten Preussischen und Hessischen Staatsbahnen, Berlin, 1903, pp. 488-492.

return upon investment. The return upon the investment may have to be somewhat higher under private ownership than under government ownership because of the greater risk to capital under the former, but some return upon capital should be secured even under government ownership to prevent wasteful extensions of railway facilities. If new railway investments in the long run do not return as much as the prevalent rate of interest on well secured long time loans, the inference is that the money could have been invested somewhere else to meet more important needs, unless it can be shown that the public derives benefits from the investment which are not to be measured in terms of money. It may be wise to have expensive architecture in railway bridges and buildings as a matter of public education, and possibly very low fares which contribute nothing to capital might be justified for workingmen as one means of meeting the problem of unemployment. It is not intended to exclude considerations such as these as supplementary to the statistical processes to be explained below.

It should further be stated that the influence of competition, both between various transportation agencies and between rival producing centers is one of the practical considerations which may modify the *prima facie* reasonable rate in particular instances but which is not to be considered in getting the ideal rate from the public standpoint. We assume in what follows, monopolistic control. Again, it is likely that the various roads in a particular region will show different theoretical rates. It is for practical judgment to say whether these shall be averaged or whether a particular one is to be selected as representative. Such situations have frequently been described and disposed of by the Interstate Commerce Commission in its decisions.

The theoretical rate also will vary from division to division on the same road, but this need cause us no concern. The divisions of a railroad within a given rate territory would be considered as a unit. In theoretical rate statistics it is not necessary to be more refined geographically than traffic men are in their construction of rates. The difficulty exists, however, that a railway system frequently extends over several rate territories, while the financial and operating statistics are not similarly divided. This may be overcome by a suitable revision of our statistical reports.

II

PRELIMINARY SURVEY OF A RAILROAD'S
INCOME AND OUTGO

In order to have concretely before us the subject matter with which we are dealing, it may be well to summarize the entire income and outgo of a railroad and also survey the work it performs. For this purpose we choose a road of simple organization, the Chicago, St. Paul, Minneapolis and Omaha. The following statistics are from the preliminary abstract of the statistics of common carriers for 1914.

Chicago, St. Paul, Minneapolis and Omaha (1914)

Income:		Outgo:	
Freight Revenue.....	\$11,427,563	Railroad Operating Ex-	
Passenger, mail and ex-		penses.....	\$12,632,571
press.....	6,275,335	Auxiliary operations.....	201,546
Miscellaneous operating		Taxes.....	973,283
revenue.....	289,473	Rentals, etc.....	661,573
Auxiliary operations.....	217,713	Interest on Funded Debt.....	2,052,901
Miscellaneous		Dividends.....	2,086,910
rents and interest	233,405		
Total.....	\$18,443,489	Total.....	\$18,508,784
Excess of outgo, not including profit and loss adjustments, \$65,295			
Services to the public:		Operations required:	
Revenue passengers carried 4,881,961		Locomotive-miles, revenue	
(passenger-miles, 266,685,999)		and non-revenue.....	11,321,817
Tons of revenue freight.. 8,466,632		Car-miles, revenue and	
(ton-miles, 1,294,143,291)		non-revenue.....	134,936,006

To connect this statement with our present problem, it may be observed that the revenues shown in the first column are paid by the public in return for the services indicated, and the outgo shown in the second column is necessary for the operations required to perform the services. The word cost has been avoided in this connection because it has no definitely accepted meaning. Some writers look upon cost as covering only a part of the operating expenses, others make it cover operating expenses, others include taxes with operating expenses, others include operating expenses and a part of interest charges, and finally some make it equivalent to operating expenses and the full return on capital. We shall see in the next section what part of the rate may properly be called the cost element and what part the value of service element. If it were possible to trace the connection between the particular service and particular portions of the outgo, we could solve the rate question by simply charging each service with the outgo it occasioned. But the connecting of service and outgo is not possible for all the items of outgo. If possible at all it can be done only by a somewhat complicated process. The analysis of the relation between the items of outgo and service rendered is the gist of the economic theory of railroad rates.

III

IS A RAILROAD AN INDUSTRY OF "INCREASING RETURNS" ?

An industry of increasing returns is one in which an increase in the volume of business done by a given enterprise results in a reduction in the cost of performing a unit of service. This may result, on the one hand, from the fuller utilization of an existing plant, or, on the other hand, from the substitution of a more efficient plant for

a less efficient one in so far as this is dependent upon a mere increase of traffic. There is a clear gain from having the existing cars, locomotives and tracks of a road utilized to their fullest capacity. But when a single track road has become congested the gain from this source ceases. If a parallel road were then built with the same sized cars and locomotives, the same process would be repeated and in the long run the industry would be one of constant costs. But as the traffic increases, the entire plant is not duplicated. A double track is substituted for a single track, heavier rails are laid, and larger cars and more powerful locomotives are purchased. Here is a new source of gain distinct in kind from the former. Doubtless there are also limits to this kind of economy and perhaps that limit has been nearly reached on a number of roads of densest traffic.

Of these two kinds of economy that have made the railway so conspicuously an industry of increasing returns, it is the former, the fuller utilization of a large existing plant, that writers have had in mind when they have spoken of railway expenditures as divisible into constant and variable. Take for example a paragraph from Sax:

A closer examination of the cost elements which have been distinguished shows at once that with a given degree of intensity of traffic they require a certain minimum outlay, from which point the cost does not grow in exact proportion with the traffic, but lags behind the latter. This is true historically of individual roads and geographically in the comparison of roads of varying degrees of intensity of traffic, and results especially from the fact that certain elements of cost, within wide limits, are independent of the frequency of the traffic, while others vary with the volume of the traffic. A similar condition exists with respect to other fixed plants, but not to the same degree as in the case of railroads, and this is true partly on account of natural influences and partly on account of the economic position of railways.¹

¹ Sax, E., *Verkehrsmittel*, vol. II, p. 363. Vienna, 1879.

He goes on to say that the diminished cost resulting from a growth in traffic cannot go on *in infinitum* but comes to an end when a given plant approaches the limit of its capacity. Very generally we find that writers who expound the gain from a fuller utilization of existing plant, qualify their statements, admitting that it holds only within limits, and then they proceed to neglect the qualification. For example, Rank, after explaining these limits,¹ distributes all return on capital on the basis of ability to pay. The writer believes that there has been an overemphasis of the gain which results merely from a more complete utilization of plant and that the gain which has been realized from more improved methods, such as the use of heavier locomotives, is the more important after railroads have passed the stage of infancy. Perhaps we have here an illustration of the fact that to a considerable extent economic theory is a reflex of past economic conditions because a theory once generally accepted persists long after the conditions which have produced it have changed.

The distinction between these two classes of economy is illustrated by the fact that a road of moderate density may employ as large locomotives as one of the greatest density but not so many of them. It is not clear that the train loads of coal on the Norfolk & Western would be increased even with a large increase in that class of traffic. In other words, it is customary for any road that has attained considerable traffic to load its engines to their capacity in the direction of heavy traffic. But still, a considerable density must be achieved before the largest locomotives are justified so that this source of economy must be regarded as in part due to a mere increase in traffic.

¹ Rank, E., *Eisenbahntarifwesen*, p. 321. Vienna, 1895.

While it is desired here to emphasize the limits to these two sources of economy, it cannot be denied that they together have operated conspicuously in the past and are still in operation. The importance of recognizing the existence of these limits will be apparent when it is realized that the greater the economy to be regarded as resulting from a mere increase in traffic, the greater is the proportion of expenses which may be considered as fixed or independent of that traffic and the greater will be the scope to be given to the ability to pay element in rate-making, and on the other hand, the smaller the reduction in cost (counting return on capital among costs) per unit of traffic, resulting from a mere increase in traffic, the greater becomes the justification for cost of service rate-making. This point will be made more clear below. We must proceed, therefore, to inquire more closely into the economy resulting from a mere increase in traffic. We may note here that many influences not peculiar to the railroad industry may have a marked influence on railroad average costs. Labor-saving inventions and increases or decreases in wages and prices are illustrations. These modifying influences do not directly concern us in the theory of rates because they may affect any class of expenditure, those directly as well as those remotely related to the traffic, although they make difficult an historical comparison of the relation between traffic and expense.

The examination of the statistics of almost any road will amply demonstrate that practically no great class of expenses is unaffected by the growth in traffic. Below are given data for the Philadelphia, Baltimore & Washington system for fifteen years. The miles of line have remained practically constant, but additional tracks had to be built to take care of the expanding traffic. The traffic taken as a whole has more than

doubled, but so have total operating expenses. Investment and maintenance of way have not increased so rapidly but they have by no means remained constant. The operating expenses added to 6 per cent on the investment still show over 100 per cent increase. Considering the increase in wages there has doubtless been a gain from the mere increase of traffic, especially when the quality of the passenger service is taken into account, but one cannot study a table such as this and speak of interest charges as being fixed expenses which have no relation to the traffic.

PHILADELPHIA, BALTIMORE AND WASHINGTON R. R.
TRAFFIC, INVESTMENT AND EXPENSE
1900-1914¹

Year	Miles of Line Oper- ated	Miles of all Track	Invest- ment	Passen- ger Miles	Ton- Miles	M. of W. & St.	Total Operat- ing Expenses	Six per cent on Invest- ment plus Operat- ing Expenses
			Millions	Millions	Millions	Thou'ds	Thou'ds	Thou'ds
1900	729	1,182	\$43.94	234.7	481.1	\$1,876	\$7,547	\$10,183
1901	717	1,185	43.53	246.9	496.6	1,843	7,814	10,426
1902	717	1,214	41.44	256.2	539.0	1,748	7,943	10,429
1903	710	1,279	47.12	288.3	608.1	1,724	9,027	11,854
1904	707	1,326	50.46	292.3	669.1	1,618	9,820	12,837
1905	707	1,337	52.19	308.2	691.3	1,592	10,295	13,426
1906	707	1,351	56.17	327.8	761.3	1,783	10,865	14,235
1907	707	1,388	59.22	360.6	841.5	2,037	12,453	16,006
1908	714	1,418	60.91	370.5	857.4	2,108	12,861	16,515
1909	716	1,423	61.71	355.2	895.0	2,181	12,638	16,340
1910	717	1,398	64.66	366.5	1,058.5	2,698	13,668	17,548
1911	713	1,414	66.20	387.7	1,120.1	2,770	14,641	18,613
1912	713	1,424	66.69	399.3	1,081.8	2,708	15,007	19,008
1913	718	1,432	69.27	442.0	1,252.5	3,416	17,073	21,229
1914	717	1,467	71.23	435.9	1,220.6	3,198	17,110	21,378

¹ From an exhibit submitted on behalf of this company in a case before the Interstate Commerce Commission (Docket 7730).

One would hardly attempt from a mere historical statement of this kind, even if extended to cover many other roads, to draw a conclusion as to the extent of the gain from a mere increase in traffic, since there are many other influences at work tending to increase or decrease costs. A somewhat more reliable evidence comes from a comparison of roads of varying densities at the present time. This eliminates those changes in wages, prices and new methods which are common to all roads. But in this case also we cannot expect absolutely definite results because of the varying traffic conditions, geographical variations in wages and prices, and differences in efficiency of management prevailing on various roads.

The first thing that strikes us is that very great variations in traffic density may take place without any marked difference in the expense per unit of traffic, altho the statistics available probably warrant the common opinion that with an increased density the tendency of the average expense per unit is downward. Doubtless there is a limit somewhere, but it has been asserted that with sufficient density, a cost of one mill per ton-mile could be attained.¹ Without disputing the downward tendency, it seems necessary to have a clear notion of the rate of progression downward. Let us first compare the large roads in the eastern, southern and western districts. Table I following shows the estimated operating expenses for various units of freight traffic and also the density of traffic measured by the same units:

¹ Ripley, W. Z., *Railroads*, vol. i, p. 85.

TABLE I
*Operating Expense and Density of Traffic, Large Railroads, 1914,
 by Districts*

Item	Eastern District	Southern District	Western District
<i>Freight Traffic per mile of line operated</i>			
Net ton-miles (millions)	2.45	1.18	0.74
Gross ton-miles ¹ (millions)	5.36	2.73	1.81
Loaded car-miles ² (thousands)	104.56	55.40	39.94
Loaded and empty car-miles, including caboose (thousands)	161.54	86.11	58.83
<i>Estimated average operating expense³ for a 200-mile haul</i>			
Per net ton-mile (mills)	4.14	4.80	5.99
" gross ton-mile (mills)	1.88	2.07	2.44
" loaded car-mile (cents)	9.65	10.20	10.96
Loaded and empty car-mile (cents)	6.25	6.56	7.44

It will be seen that the difference in density is greater between the south and the east than between the south and the west, but this is not true of the operating expense per unit. The similarity in the car-mile expense in eastern and southern districts in spite of the difference in density is also of interest. The indication is that the economy of having more car-miles per mile of line within the limits represented by the table is about offset by the added cost of hauling and repairing heavier cars, leaving the greater load in the car as a net gain. We are obviously handicapped by the lack of a homogeneous unit of service. A

¹ Includes weight of cars and contents but not of locomotives. Freight car-miles in revenue service, not including special car-miles, were multiplied by an assumed weight of 18 tons and the net ton-miles added to the product.

² Freight car-miles in revenue service, loaded, not including special car-miles.

³ Total freight expenses approximated by multiplying freight revenue by operating ratio for all business. — No allowance made for switching and miscellaneous revenue. Equation for a 200-mile haul made by assuming that initial and terminal services combined are equivalent to an 80-mile road haul. The average haul as reported is not always reliable because of possible duplication of tonnage on the same road.

net-ton of coal traffic cannot be compared with a net-ton of excelsior, and a car of coal containing 50 tons cannot be compared with a car containing 10 tons of household goods. The gross ton-mile, which combines the tare-weight of the car and contents, is, for the same length of haul, the nearest comparable unit of service that we have, although even a gross ton-mile of a lightly loading commodity probably represents a more costly service, when density of the traffic is the same, than a gross ton-mile of a heavy commodity.

To look at the relation between outgo and traffic density comprehensively, let us examine the table and chart covering the larger roads in the preliminary abstract for 1914. (See Table II and Chart A.)

It will be seen that when the density of traffic is plotted along one axis and the gross ton-mile operating expense along another, each mark representing a road, a curve may be discerned which descends rapidly at first and then gently. What this curve seems to tell us is that for a time an increase in traffic density results in rapidly declining costs per unit of traffic, but when a density of four million gross ton-miles per mile of line is reached, the decline is very gentle thereafter. But we must be careful not to jump at conclusions here. It happens that increased traffic density per mile of line has been accompanied by an increased trainload and carload and a high percentage of mine products. Not every increase in traffic per mile of line decreases the expense corresponding to the curve shown in chart A. Obviously the extent of the reduction in expense is affected by the extent to which it permits of an increased trainload or carload. Compare, for example, the data in Table II for the New Haven and Boston & Maine on the one hand with those for the Vandalia and C. H. & D. on the other. Nevertheless, among roads of similar

TABLE II

*Freight Operating Expenses and Density of Traffic for Roads having
Operating Revenues of more than \$10,000,000, 1914¹*

Road	Freight Gross Ton-Miles per Mile of Line	Estimated Operating Expense per Gross Ton-Mile for a 200-Mile Haul	Road	Freight Gross Ton-Miles per Mile of Line	Estimated Operating Expense per Gross Ton-Mile for a 200-Mile Haul
	(Millions)	(Mills)		(Millions)	(Mills)
Penn. R. R.	10.9	2.02	Atl. Coast Line	1.4	2.53
New York Central ..	7.0	1.89	Ch. & Ohio	5.9	1.57
Balt. & Ohio	6.3	1.96	Seaboard Air L.	1.4	2.45
N. Y., N. H. & H.	3.0	2.87	Central of Ga.	1.2	2.73
Penn. Company	8.9	1.48 ²	Mobile & Ohio	3.5	2.16
Lake Shore	7.6	1.71	Nashv., Ch. & St. L. .	1.9	2.72
Erie	7.2	1.83	Yasoo & Miss. V.	1.9	2.19
Boston & Maine	3.0	2.64	C., N. O. & T. P.	8.1	2.19
Phila. & Reading	10.0	1.79	A. T. & S. Fe.	1.9	2.74
Pitta., C. C. & St. L. .	7.3	1.76	C. B. & Q.	2.3	2.17
D. L. & W.	9.1	2.01	So. Pacific	1.8	2.91
Lehigh Valley	7.8	1.99	C. M. & St. P.	2.1	2.20
C. C. C. & St. L.	4.4	1.95	C. & N. W.	1.9	2.22
Mich. Central	4.7	1.87	Great No.	1.9	2.32
Wabash	3.3	2.07	No. Pacific	2.0	2.48
C. R. R. of N. J.	8.1	1.81	C. R. I. & P.	1.7	2.52
D. & Hudson	6.9	1.88	Union Pacific	2.7	2.48
Ph. B. & W.	4.3	1.87	St. L. & S. F.	1.6	2.67
Pitta. & L. E.	16.6	1.56	Iron Mo.	2.2	2.18
Pure Marq.	1.8	2.60	M. K. & T.	1.4	2.71
C. & E. Ill.	3.6	1.90	M. St. P. & S. Ste. M..	1.6	2.11
No. Central	7.1	1.74	Mo. Pacific	1.5	2.61
Long Island .....	.7	2.71	D. & R. G.	1.3	3.04
N. Y., Ch. & St. L. .	8.5	1.71	Oregon Short L.	1.7	2.63
Maine Central	1.5	2.23	Texas and Pacific	1.9	2.65
Vandalia	3.0	1.80	C., St. P., M. & O.	1.8	2.39
El. J. & Eastern	3.7	1.51	Oregon-W.R. & N.Co. .	1.1	3.32
Buffalo R. & P.	6.4	1.72	Ch. Great Western ..	2.2	2.43
C. H. & D.	2.9	2.07	Ch. & Alton	3.4	2.07
Southern Ry.	1.8	2.41	G. C. & S. Fe.	1.7	2.73
Illinois Central	3.9	1.92	G. H. & San A.	1.8	2.86
Louisv. & Nashv.	2.7	2.34	Kansas City So.	2.9	2.32
Norfolk & W.	8.9	1.53	San P., L. A. & S. L. .	1.3	3.07

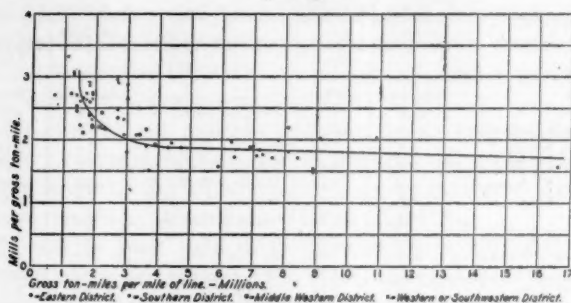
¹ Explanation of terms as in Table I.

² On basis of 2.16 mills for an average haul of 77 miles, which may be too low.

composition of traffic doubtless some such relation of density of traffic and cost per unit as is indicated by the diagram will hold.

CHART A

Relation of Density of Traffic and Operating Expense per Unit of Traffic



EXPLANATION. — The diagram was constructed by using the data in Table II, density being measured along the horizontal axis and operating expense per gross ton-mile along the vertical axis, each dot representing one road. The curve was drawn after the dots were entered to show what appeared to be the general trend.

The data given above relate to a single year and to a small number of roads, but the writer has made sufficient additional studies to show that a similar table covering a series of years and all roads would not greatly modify the diagram. It will require a considerable development of cost statistics to permit of more definite conclusions than is possible from the crude methods above adopted. It will be assumed for the purposes of this article that the law of the relation between density of traffic when formulated will be in harmony with the view that the gain from a mere increase in traffic is greatest in the earlier stages of railroad development and that the average operating expense per unit of the same kind of traffic tends to be a constant when a density of traffic has been reached which prevails on the

leading roads in the eastern district today. Furthermore, it is believed that a similar statement may be made concerning the capital cost per unit of traffic. Until the valuation of railroads is completed we cannot test this aspect of the matter satisfactorily, but a study of net operating revenue per ton-mile gives a curve similar to the one shown in chart A.

If this view is correct, some important conclusions follow. In the eastern district cost of service must be considered the chief consideration in rate-making and value of service a minor element, while in the south and west value of service is properly a somewhat more important element temporarily. This follows from the fact that when expenses grow less rapidly than the traffic, a portion of the expenses may be looked upon as absolutely independent of the traffic and a portion as varying exactly with it. Thus, to use Acworth's illustration, if a three-fold increase in traffic causes a two-fold increase in expense, we may regard one-half the expenses as independent of the traffic, and one-half as varying three-fold with the traffic, since one-half plus three times one-half is two. If a three-fold increase in traffic causes the expense to grow 280 per cent, the constant element would be only 10 per cent.

The constant element represents the scope for value of service, since new traffic may be economically invited without regard to the constant expenses, the burden of which should be distributed over the traffic which can best bear it. This has been explained by many authors.¹

¹ J. M. Clark, in his *Standards of Reasonableness in Local Rate Discriminations*, has criticised the writer for saying that the distinction between constant and variable expenses is not the same as that between special and general expenses, altho the two are related. He says they are the same. Sax long ago denied that they are the same, and said that when we are speaking of constant and variable expenses in relation to traffic we have in mind use units (passenger-miles and ton-miles), while when we speak of general and special we must have in mind operating units such as train-miles; because one can trace practically no expenses directly to a passenger-mile but one can do so with respect to entire trains. Sax was on the right track but did not state the matter fully

When the appropriate spheres of value of service and cost of service have been determined for each rate territory, the percentages found should be regarded as applying generally to all the large groups of outgo, to capital charges, maintenance of way, and transportation expenses. This is contrary to convention and might seem to be out of harmony with the data given on a previous page for the Philadelphia, Baltimore & Washington where the maintenance of way outlay and capital charges increased less rapidly than the rest of the operating expenses. But it should be considered that the most marked increases in wages have been among the higher classes of equipment and transportation employees. Great economies have been realized in the transportation department which have been made possible by a growth of traffic. For this reason, and because of the practical difficulties of proceeding otherwise, the percentages found will be regarded as applying generally to capital charges and to all classes of operating expenses.

This will also hold for taxes. Certainly traffic growth has actually brought with it a growth in taxes. As traffic causes an expansion in property investment, taxes on the property basis will also increase. There might be justification for distributing taxes entirely to various classes of traffic on the basis of ability to pay, since the faculty principle is the most generally accepted principle of taxation theory. The fact that the state does

enough. The constant and variable expense distinction implies that a series of years is under consideration and becomes definite only when a period of time is specified. The distinction between general and special becomes clear only when a unit of traffic is specified, be it the ton, the car, or the train, or groups of trains, and the term special includes more or less of the expenses according to the size of the unit. It is true that the expenses which are most markedly special are also mostly markedly variable, that is, those which can be attributed to a particular car will also increase with a comparatively small increase in traffic. To dispute as to whether this makes the two concepts the same would be a quibble, but we certainly have two quite different viewpoints of the same thing at least.

not levy all railway taxes on this basis is no reason why an ideal rate system should not pass the burden on in a different manner. But to avoid dragging in the theory of taxation, it would be better to make no separate treatment of taxes.

IV

BRIDGING THE GAP BETWEEN THEORY AND PRACTICE. REVIEW OF SELECTED AUTHORS

Assuming the conclusions in the foregoing section to be accepted, how can we make a rate on the basis of them? The answer is that it involves on the one hand a process of what is often called cost accounting (better named statistical cost analysis), and on the other hand a process of assessment to cover the contributions according to ability to pay. Many attempts of this kind have been made of varying degrees of completeness, and it may be of service if a number of these are summarized.

The writers selected here are not the best known authors on railway rates. The reason for omitting Sax, Ulrich, Colson, Hadley, Taussig and Ripley is that these writers do not translate statistics into rates, whereas those here selected do so.

In 1890 Launhardt¹ contributed three articles to the *Archiv für Eisenbahnwesen*, two of which are general for all classes of traffic, the third dealing in particular with the construction of passenger fares. It is the last of these that especially concerns us at this time. He first makes definite the distinction between constant and variable costs. Among the former, that is, those dependent on the volume of the traffic, he includes the transportation operating expenses, 10 per cent of general expenses, and the renewal of rails and switches, the

¹ Launhardt, W., "Theorie der Tarifbildung der Eisenbahnen," *Archiv für Eisenbahnwesen*, (Berlin) 1890, pp. 1, 161, and 911.

maintenance and renewal of equipment and the interest on the investment therein. Strictly, he says he should also include the investment in freight warehouses and shops, switching tracks, and the like, as varying with the traffic. He does not find it practicable to do this and so arbitrarily rounds off his results upward in getting his final variable costs. He then divides expenses between passenger and freight, not by individual accounts, but by comparing operating results on various railway operating divisions which have varying proportions of freight traffic, using algebraic formulae. He then finds the cost of axle kilometers and train kilometers, subdividing the train costs into those which are independent of the number of axles and those which vary with the number of axles, separately for freight and passenger. In this way he gets a varying cost for trains of different lengths. By finding the number of passengers per axle for the various classes of passenger traffic he finds the average cost per passenger-kilometer. So far he has dealt only with the variable costs. The constant *operating* cost (not including interest) he finds to be 6540 marks per kilometer for the average of the Prussian system, but he finds that various operating divisions show the constant cost to vary, being 10,000 in one case and 5,800 in another. These divisions are widely different in density of traffic, that is, the so-called constant expenses themselves vary with the traffic more or less.

Launhardt does not proceed to distribute the constant expenses to the various classes of traffic. The variable expenses give him simply the lower limit of the rate for each class of passenger traffic. The highest limit he then determines by the effect of various rate levels on the volume of traffic. For this purpose he formulates a law of travel, finding the number of persons who will travel specific distances at a particular rate, and then he

determines the rates which are most advantageous to the railway administration in yielding the highest net surplus over cost. He finds that the fares then existing were too low for short distances and too high for long distances.

For the benefit of the intending reader of Launhardt it may be noted that his articles bristle with mathematical formulae. These articles are noteworthy because of their rigid adherence to fundamental economic principles, altho some of the assumptions may not be warranted.

A treatise published by Rank¹ in 1895 contains in addition to a review of the theory of rates a detailed analysis of railway statistics from the standpoint of cost. He makes a sharp distinction between the cost element and the value of service element in rate-making. The cost element he restricts to those operating expenses which grow directly from the performance of a service. Thus interest and amortization are omitted. These, in his view, are profit, not cost. The operating expenses he thinks can, without great error, be divided according to service units while the profit requires more or less exclusive consideration of ability to pay.

He first divides all operating expenses between station expenses and distances expenses. He does this by groups of accounts. The next step is the division between passenger and freight. This separation is made account by account in the manner which has become familiar here in rate cases since the Buell case in Wisconsin.

The cost of a particular service is found by first ascertaining the axle-mile distance costs for the particular type of train and dividing by the passengers or tons per

¹ Rank, Emil, *Das Eisenbahntarifwesen in seiner Beziehung zu Volkswirtschaft und Verwaltung*. Vienna, 1895.

axle. To this distance cost must be added the station costs, independent of distance, which are assigned equally per unit, that is per passenger and per ton, respectively. The variation in the net to the tare load is taken account of in the case of the distance costs, but apparently not in the case of the station costs.

He then passes on to the discussion of the distribution of the profit. He does not specifically divide this as between passenger and freight by a formula. It will be a matter of experience, he thinks, as to what each branch of the traffic can bear. He would spare the passenger traffic as much as possible as the latter has the greater elasticity of demand. In general he would make the profit decrease relatively with the distance, in both freight and passenger traffic. As the value of service cannot be directly measured, he would make the selling prices of the goods the measure instead (at the point of cheapest production). This portion of the subject is treated at length, but not statistically.

A little book written by an American railroad official in 1904 is of interest in this connection.¹ He finds that if accounts are properly kept we can get an actual distribution as between passenger and freight of "probably not less than seventy-five per cent of the [operating] expenses." The remainder he thinks can reasonably be allotted on the basis of gross ton-mileage, which he thinks is the nearest approximation to an absolute unit of service in transportation. By keeping suitable accounts on a southern railway for a ten year period, (1875-1884) he found the gross ton-mile operating expense for passenger service to be 4.34 mills and for freight service 3.24 mills. He found that for the same period under similar conditions there was little variation

¹ Talcott, T. M. R., *Transportation by Rail: An Analysis of the Maintenance and Operations of Railroads*. Richmond, Va., 1904.

as between roads. Interest and rentals, he says, are not only a part of the cost of transportation but an obstrusive element of cost. But in reality he treats interest charges not as cost, but as profit to be distributed in accordance with the ability to pay, which is not treated statistically. It should be noted that in using gross ton-mileage to divide between passenger and freight he takes speed into account by reducing the gross ton-mileage of various trains to a speed of one mile per hour, that is, he multiplies the gross ton-miles of each class of trains by the average speed in miles per hour. A study of cost in relation to distance leads the author to the conclusion that rates should increase with the square root of the distance.

His subdivision of cost as between various classes of freight traffic is restricted to the classes, general tonnage, stone and coal, and switching. The passenger train expenses he subdivides as between passenger, mail, and express on the basis of gross ton-miles.

Incidental mention may be made here of an old cost analysis by Shinn,¹ who was for two years president of the Ashtabula, Youngstown, & Pittsburgh Railroad. He had experience in the steel business and as a civil engineer. In 1890 he was president of the American Society of Civil Engineers. The article before us is an account of a special report the author was called upon to prepare regarding the freight traffic of the Pittsburgh, Fort Wayne & Chicago, 1865-68, with a view to settling the important point as to where transportation becomes actually unremunerative and at what price it will justify an increase of facilities in order to increase the tonnage. By showing that certain expenses are independent of the growth of the traffic he was able to

¹ Shinn, W. P., "Analysis of Cost of Transportation," *Journal of the Railway Association of America*, No. 2, May, 1875.

justify a very low rate. His results were at that time criticized by J. B. Jervis, a consulting engineer, in a letter dated November 22, 1866, written to an official of the Pittsburgh, Fort Wayne & Chicago, and published by Mr. Shinn. After noting that a small increase in traffic would not affect certain items of expense, he says:

With some [expenses] the ratio would be very small, and at first sight appear to be nothing, still it may be questioned whether the experience of railways after reaching a volume of traffic that gives a pretty full occupation to regular trains has materially reduced the ratio of expense by an increase of traffic. The reduction that has taken place may be largely accounted for in the improved facilities that have been made, in superior accommodations for the repair and management of machinery, for the supply of water, and the general transaction of business that have grown up under railway experience.

It is interesting to find this early conflict of opinion as to where the line between constant and variable expenses should be drawn.

The methods worked out in the railroad commission of Wisconsin were described by Commissioner Erickson in a paper prepared in 1910 for the National Association of Railway Commissioners.¹

At the outset Mr. Erickson lauds cost of service rate-making as more scientific than value of service rate-making, but the method which he presents is in fact a combination of cost of service and value of service. His treatment is at many points in general terms, the detail being illustrative rather than complete. So far as it can be made out from the article the theory and procedure may be summarized as follows:

There are certain fixed expenses (including a portion of the interest charges) which within certain limits do

¹ Erickson, Halford, "Freight Rates." Reprint (1914) of a paper submitted to the National Association of Railway Commissioners, Proceedings, 1910, p. 186. Compare the earlier article by Commissioner B. H. Meyer in the same Proceedings for 1907, p. 105.

not increase as rapidly as increases in the business. The fixed expenses should be borne by the traffic best able to do so. Low-priced articles should pay rates high enough to cover operating expenses, "including something in the way of net earnings." The method of rate construction advocated is to divide operating expenses and the investment charge between passenger and freight and also between terminal and line service. Freight terminal expenses are then divided by the number of loaded cars, the result being assumed to be constant for any load per car. The freight movement expense is determined per gross ton-mile for the average load per car and the gross ton-mile cost is assumed to be constant for any load per car. From these data the cost of carrying a commodity any distance can be found if the average load per car is known. Upon these average cost results is then ingrafted the existing freight classification "by determining the position of the average rate under average loading for the traffic as a whole," and the rates for the various classes are reached by using a fixed percentage relation between the classes. The average rate is found to be a little less than class C and a little more than class D in the western classification. The author recognizes that the existing classification is based on value and bulk, while ability to pay freight rates per ton rests upon the relation between value and weight.

What may be looked upon as a refinement of the method of Mr. Erickson is found in an exhibit by F. H. Millard in the Western Rate Advance Case of 1915.¹

The total rate is divided into two portions. The cost portion is made to cover operating expenses, taxes, and rents, while the value of service element is a contribution to interest on investment. The cost computations

¹ 35 I. C. C. Reports, 497 (562, 649).

involve first a separation between passenger and freight and a division of the latter between terminal and movement service. The terminal cost was subdivided among various branches of the freight traffic partly according to the number of cars handled and partly according to the number of gross tons handled. Movement cost was subdivided among various branches of the freight traffic according to the number of gross ton-miles. Empty car-mileage was subdivided by classes of traffic, according to the mileage of the type of car used by each class of commodities. In this way cost units were arrived at from which the cost of moving any commodity for a given distance can be calculated if the load per car is known. The expense for the loss and damage of freight was considered a cost and allocated directly to each class of freight.

The contribution which each commodity must pay to cover interest charges was found as follows: Total interest (or dividends) was divided between passenger and freight in the same proportion as the expenses were divided, there being no method known of measuring the total ability of the passenger service and the freight service respectively to bear interest charges. The interest charges thus apportioned to freight were subdivided between terminal and line movement services again as the expenses were found to be divided. The subdivision by classes of commodities was achieved by classifying commodities according to their market value into twenty-four classes, the lowest containing those commodities which had a value of less than \$2 per ton and the highest those having a value over \$205. The total interest charge was then subdivided among these classes of traffic by assigning to the lowest class an amount which, if the same amount per ton and per ton-mile were assigned to all traffic, would equal 4 per cent

on the investment of the road, and the other classes were charged with other portions of the interest in such amounts that if all traffic were taxed equally with any particular class, per ton and per ton-mile, the return on the investment would have been respectively $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, 7, . . . 25 per cent.

Millard's work is the most definite and complete that has as yet been performed in the line of attempts to derive a theoretically reasonable rate purely from statistics of railway traffic and operation. It was necessary at certain points for him to use arbitraries where further development of accounting may some day yield exact information. There are also certain points of theory which further discussion may modify.

Any one who attempts to make rates from statistics must first decide whether he will consider the value of service as between various classes of commodities. If he decides to do this he must also decide how large a scope he will give to this element. Millard drew the line by making this element cover the interest on investment. While this may have been practically justified for the roads considered, it is open to attack from the standpoint of theory. The interest charges on equipment are as closely related to the traffic as are the maintenance charges for equipment, and, as has already been shown, other interest charges are also indirectly affected by the growth of traffic. In a way this has been met in the exhibit before us by making all traffic contribute at least 4 per cent on the investment. But if this minimum of 4 per cent be looked upon as being placed upon all traffic because interest charges bear some relation to growth in traffic, then this minimum should be distributed according to the use made of the capital, that is possibly according to gross ton-miles, but not according to net ton-miles.

Again, all operating expenses cannot be looked upon as varying with the traffic. A part of them should also be distributed according to the ability to pay. As already indicated, it is doubtful whether from the social standpoint taxes can be regarded as an operating expense. They seem more closely related to the ability to pay. Again, net rents are in whole or in part payments for the use of capital.

Another criticism that might be offered relates to the distribution of the return on investment as between the various lengths of haul. In the Millard exhibit, a net-ton hauled a thousand miles is taxed ten times as much for the return on capital assigned to movement service as a net-ton of equal value hauled one hundred miles. Cost may grow with the distance but does value of service? To a certain extent distance affects value of service. In order that the value of service of hauling oranges may be high, the haul must be long enough so they may reach a point where the climate prohibits the production of oranges. But in reality it is the difference in the cost of production, not the distance, that is closely related to the value of service. Logically, the ability-to-pay-tax to be levied on a particular class of commodities should be distributed equally per ton regardless of distance. In practice, some concession would have to be made to the short hauls because of the competition from other means of transportation.

A criticism related to the preceding is that Millard adds the ability-to-pay-tax to the cost regardless of whether that cost is high or low. If a commodity must pay a high rate because its cost of carriage is high, should not the value tax be eased up a little? Ability to pay in rate-making should mean ability to pay freight rates, not ability to pay something in addition to the cost of carriage.

In order that statistics may become the basis for a scientific system of rates, a considerable modification in the reports now made by railways will be necessary. It is desirable that expenditures be divided by classes of traffic so far as practicable. In this connection it may be noted that the Interstate Commerce Commission has recently issued an order, effective as of July 1, 1915, requiring the larger railway companies to distinguish their freight expenses from their passenger expenses. The carriers are expected to assign to freight service or to passenger service such expenses as are directly or naturally assignable and that this direct assignment will be carried to the fullest extent that is practicable without undue increase in accounting expense. Thus, the expenditures falling under the accounts relating to car repairs, train enginemen and fuel for train locomotives are almost altogether directly assignable. On a number of roads steam locomotive repairs can be assigned directly. The order of the commission also prescribes rules for apportioning most of the items common to both freight and passenger services. Yard expenses not directly assignable, for example, are to be divided according to the number of switching locomotive mile in each service. The important accounts relating to roadway track maintenance, however, are to be recorded as undivided. Obviously we should have studies which will further segregate the expenses attributable to less-than-carload business, to fast freight lines and to the mail and express services.

Most conspicuous is the lack of adequate traffic statistics giving details as to the revenue and volume of traffic for various classes of commodities. Again, our financial and operating statistics do not conform to rate territories. It is to be hoped that the valuation of railways will give us more information as to the assignment of

various portions of the investment to classes of service, such as freight and passenger, and to terminals as distinguished from the roadway. Much detailed work must be done before a satisfactory result can be achieved, but it is important that theoretical discussion yield definite principles which shall guide those who must do the work of detail.

M. O. LORENZ.

WASHINGTON, D. C.

JOINT COSTS WITH ESPECIAL REGARD TO RAILWAYS

SUMMARY

Introductory: Pigou's theory of joint cost, 233. — I. Joint cost defined and analyzed. (1) Different utilities. Difference in utility capacity, 234; in market, 236. — Difference in utility means difference in assigning costs, hence discrimination, 236. — Difference in market may make joint expense in case of single commodities, 237. — (2) Necessity of common dependence on same expense. Physical *v.* economic necessity, 238. — Primary and secondary jointness, 239. — Mixed primary and secondary jointness, 240. — Wide range of necessary joint production, 241. — (3) No direct relation between expense and output, 242. — Constant and variable joint expenses, 243. — Validity of this distinction; overworked marginal analysis, 243. — II. Conclusions: (a) Complexity of the joint-cost concept, 245. — (b) Expediency of broad definition, 246. — (c) Relation between joint cost and monopoly as causes of discrimination, 247. — Suggestions for rate regulation, 249.

IN his recent book, *Wealth and Welfare*, Professor Pigou challenges the prevailing view concerning the applicability of joint costs to railways; and later, in a controversy with the proponent of that view, Professor Taussig, he seeks to maintain his position.¹ The prevailing view is too familiar to require restatement. Professor Pigou's contention, briefly stated, is that the concept of joint costs should be narrowed considerably, and should be applied only (1) when two different things are necessarily produced together — joint supply; and (2) when under competition the same rates would not be charged. Thus iron and copper transportation services would not be subject to the principle of joint cost, according to Professor Pigou, for (1) the transportation of the one does not necessarily entail the transportation of

¹ Quarterly Journal of Economics, 1913.

the other, and (2) under free competition transportation agencies would charge the same rates per ton per mile for the two metals.

Without further direct discussion of the arguments of these two noted economists, the writer will present as systematically as possible his own ideas, and inquire what modification, if any, Professor Pigou's criticism calls for.

I

Joint costs may be tentatively defined as those expenses, incurred in the joint production of two or more different utilities, which can not be imputed to any one of the utilities separately. Back of this definition may be seen several factors: difference in utility; joint production, in a primary or in a secondary sense; indirect relation between the amount of cost incurred and the quantity of utility produced. Accordingly, these factors will be taken up in order.

(1) Most obviously, if the expense is to be classed as joint, *two or more different utilities must result from the expenditure*. Production involves utility as much as cost, and to have joint production we must have joint utility. Just here, however, lies one of the grounds of misunderstanding and dispute; for what constitutes a difference in utility? Must we have different physical things, such as coal and copper? Must things to be different have different kinds (qualitatively) of utility and be wanted in different markets? In the case of railway service, should we consider "transport" as a single utility?

Taking up the last query first, we find Professor Pigou holding to an affirmative answer — tho later he shifts his ground¹ — insisting that, in so far as the meaning of

¹ Quarterly Journal of Economics, vol. xxvii, p. 689.

"joint" is concerned, a railway produces a single kind of utility in hauling goods of various sorts from A to B. But it is to be remembered that car miles and train miles do not measure service;¹ that transportation service is measured in ton miles. Now tons represent commodities hauled, and commodities differ in their relation to production. They differ in demand, both in kind of demand and in location of demand. (a) Commodities differ in their capacity for receiving additional utility through transportation, as is well-known to be the case as between "low grade" goods such as sand and "high grade" goods such as glass ware — the one does not "stand transportation" as well as the other. (b) Commodities also differ in the location of demand, being valued in different markets. In such cases, they may be unrelated on the demand side as to the determination of their values, and are, in a very practical sense, different utilities. As Professor Taussig remarks, "The fact that they are supplied to separate groups of demanders . . . shows that, tho both dubbed 'transport' they do not constitute a homogeneous commodity."

It seems to the writer that here, as elsewhere, confusion is likely to arise from failure to consider utility in relation to cost. Inasmuch as cost must be sanctioned by utility, difference in degree of utility or in intensity of demand — which may be generally assumed when the markets are different — means different ability to bear cost. But if the expense cannot be specifically assigned, and it is therefore not known how much of the total item is attributable to iron and how much to copper, under competition the joint expense will be apportioned according to degree of utility. In the bargaining between shipper and carrier the joint item (supplementary expense) will fall more largely upon the shipper

¹ See my article on "Railway Statistics" in *Quarterly Publications of American Statistical Association*, vol. xii, pp. 201, 209, 226.

who is more anxious to ship, and he will be the one for whose commodity there is a more intense demand. Assume even competing railways, and further assume that all prime, or specifically assignable, expenses are the same for the two commodities; if now there is a large element of supplementary expenses there is a tendency to assign such expenses where they will lie the easiest, or where "the traffic will bear" them best, which point depends upon demand and market conditions in the two cases. Take the case of iron and copper. These commodities are not so very different in physical character as affecting costs of transportation. The real difference, as expressed in different railway rates, therefore, lies in the difference in markets and demand. Put in another way, discrimination in rates is initiated by the difference in degree of utility.

Professor Pigou maintains, however, that competition would establish a uniform rate on the two commodities, arguing¹ that if the demand is higher in one market than the other, the carrier will transfer transportation to the higher-priced one, and that this transfer will start independently of the existence of joint costs. But what is a "higher-priced" market here? Since the effectiveness of demand for transport depends upon chance of gain in furnishing transport, it must be the one in which the quantity, "rate minus expense," is the greater. This quantity obviously depends in part upon the amount of expense; and, as a large part of expenses are not specifically assignable, an opportunity for difference in judgment and arbitrary treatment is present at the beginning, with the result that discrimination is likely. At the outset, then, we start with a probability of discrimination based on joint costs; and the reasoning of Professor Pigou is vitiated by making the criterion of

¹ Quarterly Journal of Economics, vol. xxvii, p. 691.

high-priced and low-priced markets (for transportation) depend upon a quantity which, if it be assumed to be non-discriminatory, puts him in the position of begging his question.

Here the question arises, can we not, then, have joint expense in the case of a single commodity, such as coal? In two different towns equally distant from shipping point and served by a given railway, the situation may easily be as follows; the citizens of A have a greater purchasing power and a more intense want of coal than the citizens of B. In B there may be a small local mine and an abundance of wood; and this alone would cause a different demand schedule due to availability of substitutes. Under this assumption, the railway or railways will, if they charge the same rate to each place, (a) either find no effective demand for transportation to one of the points, the rate being too high; or (b) serve both points, but supply one with a greater volume of traffic than the other. In the former case, there is nothing to do but confine traffic to the high-demand market, B. If the lower rate will pay specific, or prime, expenses it will probably be put in. In the latter case, the problem is at once complicated by considerations of effect of rate adjustment on assignable expenses. If an increased volume of traffic will decrease prime expenses per unit there will probably be an increased demand (in the sense of a larger number of units) for transportation to A, the larger-demand point, and the rate per unit of traffic will carry a smaller contribution to joint expenses than the rate per unit of traffic to the smaller-demand point, B.

The writer, therefore, has been led to the conclusion that discrimination, or difference in rates¹ as related to

¹ Discrimination in two senses must be borne in mind. In the true competitive sense, the same rates should not be required, but only rates equaling cost.

expenses, is probable wherever joint costs exist, and that joint costs exist much more widely than is commonly supposed; the wider field for them being due to the great extent to which differences in utility are found even among similar commodities — perhaps among shipments of the same commodity.¹ Indeed, the only case in which there is no possible problem of discrimination arising out of joint cost in the railway business, exists when a single commodity is hauled to a single market. A coal road from A to B might present such a case; but, even here, it is to be observed that several markets may exist in a given locality (B), as is illustrated by the different demands for coal in domestic industrial use.

So much for the first factor in the constitution of joint cost. For the rest, we must pass from the utility side to that of cost. Here the most obvious factor is: (2) *The expense concerned must be necessary to the existence of each and every one of the different utilities.* Unless the expense is incurred, no one of the utilities could be brought into existence. (Unless the interest can be paid upon a railway's bonds, either the road can not come into existence or can not continue to exist, and consequently can neither haul freight from A to B nor from B to A. Also, it can haul neither iron nor copper.)

This seems to the writer the better way of putting the idea that to be joint the one product must be a necessary result of the production of the other. One reason for this conclusion is that the idea of necessity is one of

¹ It may be worth while to note that any great refinement of analysis would surely deal with various important interrelations of demand. For instance there is the fact of widespread substitution. If the supply of lumber decreases, the demand for cement increases. Motor vehicles replace horses in part. The demands for corn and wheat as food stuffs are closely interwoven. In such cases the markets overlap, and the differences in utility of different commodities may become small or vanish.

those seemingly clear concepts which in reality is quite lacking in definiteness. Necessity may be physical or economic. The case of physical necessity is well illustrated by the classic wool and mutton: one can't for the life of him produce mutton without growing a little wool. The problem here is to get some use or gain out of a necessary "by-product." There is, as it were, unused capacity in the plant as it actually exists, the unused portion being a separate and distinct item. This may be called *primary jointness*; for the expense is joint to start with, and it is because it is joint that it can not be assigned.

In passing to the case of secondary jointness, an illustration will be of service. Back in the '70s cotton seed was commonly regarded by the southern planter as a nuisance and he was wont either to burn it or to cast it into nearby streams. So common did this latter practice become that laws were passed to prohibit it. The question is, was cotton seed a "by-product?" Was this joint production? One's first thought is of the present status of cotton seed, for it is a valuable product. But a moment's consideration shows that in the earlier days it was of no more use than are prune seeds today — even less, for it was an encumbrance — a disutility. Thus, tho necessarily grown, cotton seed was not product in the economic sense, nor could it be used to illustrate joint production. Today all this is changed. First, the seed became valuable for oil, meal, and cake, with the result that it became not only a physically necessary adjunct but a by-product — in the economic sense of the term, a product. Then, under the operation of competition, it became more than a *desirable* or valuable by-product: it became a *necessary* side line, and now the marketing of the seed is essential to profitable cotton farming.

By *secondary jointness*, the writer means such common production as is necessary as a condition of profit. After all, this is the true economic joint expense. The one product can be produced without the other, but only at a loss. For example, take an understocked store. The rent, based upon the potentialities of the location, eats up all the income, and some new line must be added in order to make a profit. The problem here is, not to get some gain from a physically necessary by-product, but to get some by-product to help meet an economically necessary expense. It is not a case of unused capacity, as in primary jointness, but of unused opportunity. Here the expense becomes joint, because a "side line" must be carried in order to enable the business to exist under competition.

It is important to note well the significance of the word "necessary" as used in the case of secondary joint cost. In the first place, the idea of necessity lies in the fact that some distinct item of output or traffic must be taken on, if the business is to succeed under normal and legitimate competitive conditions.¹ In the second place, it follows from the preceding statement that if the expense is not conducive to normal competitive profit — is not necessary in the sense just mentioned — it can not be classed as joint in any real or causally significant sense.

But the cotton illustration suggests the existence of *combinations of primary and secondary joint expenses*. Cotton is a physically necessary by-product; it has also become an economically necessary side line. In such

¹ If we are to have a useful concept of joint costs we must rule out such expenses as are incurred in investments or operations which result in a net loss to society. If, allowing sufficient time, it appears that the extension can not pay for itself or the equipment brings gain only to the ring of directors who sold it to the railroad corporation, these things can not be considered either necessary or jointly productive. Fraud and violence are fatal to that free exchange which is essential to the conservation of society, under the existing order. (See Haney, "Social Point of View," in *Quarterly Journal of Economics*, vol. xxviii, pp. 319-321.)

cases, not only is a large proportion of the expenses of production inseparably and necessarily joint, but also there is bound to be joint sale with interrelated prices.

The bearing of these considerations upon railway expenses should be fairly plain. Here there is no physical necessity as in the mutton-wool case. True, it might be argued that the case of back-hauls is of this sort, and this is probably why Professor Pigou recognizes the back-haul as a case of joint expense. But this is another illustration of confusing physical performance with economic service; for it is cars that have to be hauled back, not freight, and the railway *could* keep on making up trains at B merely to get its equipment back to a sole source of traffic at A. In the case of railway transportation, then, joint costs are apparently always of the secondary type — tho none the less joint on that account.

The fact is that, when time and place utilities are concerned, joint production differs somewhat from the joint production involved in creating form utilities of the typical sort. In producing wool and mutton, coal and coke, lint and seed, silver and lead, lumber and bark, materials combined by nature are separated and the one necessarily leaves the other; while in moving commodities from one point to another no such separation is involved.

An interesting case that may be taken to illustrate the preceding points — one which, if correctly chosen, shows the great range of cases in which one class of traffic may be said to be economically necessary to another — is furnished by the interrelation of commodities as raw materials for a finished product. Take coal, limestone, and iron ore for steel. If the steel industry is to prosper at a given point, if the materials must be

hauled from another given area, and if the same railway system serves that area, then a case of strong economic necessity exists: Another class of necessity in joint production comes, under private operation, from public regulation: if a railway is compelled to operate a passenger car or train between two points or to haul the mails on passenger trains, another kind of necessity compels an expense that is joint with the expenses for other services.

(3) *There is no direct relation between the amount of expense and the amount of the output of any one of the utilities concerned.* A reduction in the amount of cotton seed produced will not cause a proportionate reduction in the cost of producing lint and seed. Nor will a reduction in the amount of freight hauled from A to B reduce by a proportionate amount the expense of hauling freight from B to A. There are really two cases here: (a) In some cases the joint expenses would not be reduced at all by diminishing the output of any one of the joint products. (These are constant joint expenses.) (b) In other cases, there may be a reduction but not a proportionate one (variable joint expenses).

Constant joint expenses are found in the shape of "fixed charges" and part of "general expenses"; interest, rentals, and salaries of general officers illustrating the type. These constant expenses depend upon the size of plant and personnel needed to handle the maximum profitable business, being in this sense necessary for any part of the economically justifiable traffic. They can not be allocated specifically. They are not diminished by a decrease in amount of any item of traffic. Therefore, if used in common for transporting commodities to different markets, they come under the definition of joint expenses adopted in this paper.

But variable expenses may also be joint, as is the case with wear and tear on equipment and rails. Assuming them to be economically necessary, we merely note that, while they vary in direction with amount of traffic, they do not vary in proportion to the traffic; and the percentage occasioned by any one kind of traffic destined for any separate market can not be specifically assigned.

The importance of the distinctions which the foregoing classification assumes, has been questioned in a recent study by Professor J. M. Clark,¹ in which it is argued — as nearly as the writer can gather — that the two classifications “general (joint) *v.* special” and “fixed (constant) *v.* variable” really merge into one; that the distinction between constant and variable expenses is dependent upon the existence of joint and special expenses; and that the former distinction is not important. These conclusions appear to the writer to rest upon a failure to consider the utility side, and upon an overworked marginal analysis. In discussing an enlargement of plant occasioned by an increase in traffic, it is argued that “the increased capital instalment, when incurred, was clearly caused by a definite increase or increment of traffic, either existing or expected, and so was economically ‘special’ to that increment without which it would not have been incurred”; the idea being that, at the margin, general (joint) expenses become special, and consequently are variable. This reasoning, however, overlooks the significance of utility and different markets, with the result that “traffic” is treated as a single thing like Professor Pigou’s “transport.” Then, it is assumed that the whole situation is “caused” by the last increment of “traffic.” So common has this error in reasoning become since the advent of the Aus-

¹ J. M. Clark, “Standards of Reasonableness in Local Freight Discriminations,” in *Columbia University Studies*, vol. xxxvii, pp. 33 f.

trian School that it might be made the occasion for a digression on the significance of margins. Suffice it to say that this marginal unit of "traffic" is not the only one, but owes its position to the aggregate situation in which each and all units play their part. It is, of course, the earlier or supposedly supra-marginal units that have given rise to general or special expenses, as the case may be, and have had the effects on railway policy indicated elsewhere in the discussion of discrimination.

It is further argued by Professor Clark that, by a reverse process, special (specific) costs may become general (joint), *e. g.*, in making a commodity rate (special) on a large block of traffic, maintenance and interest (general) must be considered. But what is a large block of traffic? Are all blocks large? And how much maintenance and interest will be imputed to the block?

In general, the scope and variety of joint costs are not recognized by Professor Clark. Not only are some constant and some variable, but part of the variable expenses are joint and part are special. Variable joint expenses may be regarded as special to large traffic units, and perhaps these variable expenses are the only ones meant; but constant joint expenses can be special only in a non-causal, marginal sense. Take interest on bonds, or maintenance of roadbed necessitated by washing. If some new commodity rate is established leading to the addition of a large block of new traffic, and if new tracks and stations must be added to handle the increase, it may seem that the new traffic is chargeable with the new expense. But a little closer scrutiny shows that there is no relation between the amount of the increase in expense and the traffic yield. Just as the investment in the original plant was not made with regard only to the first unit of traffic developed, so the new investment is not

made with the idea merely of accommodating the new traffic block. Interest and constant operating expenses — those which depend on size of plant — can not be specifically assigned to anything but the traffic as a whole, and the idea of "unit" is stultified by making it apply to a "block of traffic" that is a whole.

II

Some further conclusions seem to be warranted by the foregoing discussion.

In the first place, the category of joint cost is seen to be far from simple, for jointness may be of many different degrees. (a) The *differentness* which is essential to the existence of real jointness, may be expressed in difference in physical shape, appealing to different wants, or may lie in merely different intensities of demand existing in different markets for the same thing. On account of differences in this element in the make-up of joint cost, the ease of discrimination and its social importance may vary considerably. It will usually be easier to discriminate between shipments of iron and copper, than to discriminate between coal shipments whether to the same or to nearby points; but the latter discrimination is likely to have more harmful social results, as the industrial fate of persons and communities is apt to be more directly at stake. Of course, these differences in demand intensity may be great or small. Also, as already noted, the difference in kind of commodity may be more or less obliterated by substitution interrelations. Thus cotton seed oil products and lard, beef and mutton, and the like, are different things with similar demand schedules; while corn and wheat, wool and cotton, cement and lumber, though interrelated, are economically different in a greater degree.

(b) On the cost side, the necessity of the jointness of production admits of degrees, running from physical (primary) necessity to economic (secondary) necessity and to compound (physical and economic) necessity. Bark and wool and coke have to be produced, technically speaking, when lumber and mutton and gas are produced; it is not true in the same sense that a druggist has to sell soda water or a railway carry mail, express, and all kinds of freight and passengers. In the former cases, the "by-products" may be thrown away, as cotton seed once was, or they may be sold independently of the main product, with or without any attempt to allocate any of the joint cost to them. If the price policy adopted is one of treating the joint products as complementary parts of a whole, a large part of the cost *must* be regarded as joint. But in the latter cases, there can be no question of throwing away or of independent sale: the economically necessary side line must be put on the market (or markets) jointly. Moreover, with purely secondary joint expenses it should be feasible to distinguish a larger part of the total expenses as specific (prime) to each of the separate products; for they permit of more nearly complete technical division and of more historical and experimental separation than are possible with primary joint expenses. Thus, the druggist has to install his "fountain," buy his flavoring materials, hire his clerk, and conduct a special line of advertising; and the coal railway has to build a branch from A to C, or an extension to connect with the copper ore region. Also, the druggist can keep account of the time that he bestows upon the soda water branch of his business; and the railway management can do much to record separate costs of accounting and of handling at terminals, separate risks, and the like, to say nothing of experiments to ascertain what part of maintenance

expenses are due to traffic wear and what to weather. There is more of the arbitrary in the situation, and the amount of the joint element in the expense account depends to a greater extent on the price policy pursued.

In each of these classes, too, there are degrees: in the case of railways, back-haul expenses may be said to be more of a necessity than those incurred in hauling coal from A to either of two different markets at B and C; and the latter, perhaps, than the joint account involved in handling both coal and copper between A and B—tho these are questions of fact, and may vary with circumstances.

Taking degrees both of difference in demand schedule and of difference in necessity of joint production into consideration, a kind of double necessity may or may not be present. This will depend on the character of the product as a necessity of consumption, and, as it introduces the social point of view, it suggests important considerations for public policy. If the product concerned is a necessity (such as corn, beef, and cotton), and if the product is necessarily joined with another product in production, then there is a double necessity. But if the product is wholly or partly a luxury, as is the case with much railway service, both freight and passenger, then the jointness is not necessary, wholly or in part, and the field of joint expenses might be reduced without injury to society.

(c) Finally, the degree of relationship between the output of the several joint products and the amount of the joint expense differs. It is a matter of general knowledge that some joint expenses are, for any given stage of industrial development, fixed; while others are variable, changing in the direction of the volume of output. Within each of these classes there are degrees.

All this evidences great complexity. Is it not this complexity that explains much of the diversity of opinion concerning joint costs? So the writer believes; and he hopes to have done a service in presenting an analysis that may serve to clarify the issues raised.

In the second place, it is the writer's judgment that it is expedient to adopt a broad definition of joint costs. The debate between Professor Pigou and Professor Taussig, in so far as principles are concerned, seems to come to a question of the expediency of a broad or a narrow definition; and the writer finds his conclusion more in accord with Professor Taussig's views. The great practical test of the significance of joint cost lies in discrimination; and, as has appeared, any degree of jointness, as here defined, is likely to give rise to some discrimination. It is doubtful if the degree of discrimination is in any quantitative relation to the degree of jointness, for, the occasion arising, many motives may actuate both railway and shipper in availing themselves of it. If the broad definition be adopted, all kinds of differentness in utility, and all degrees in necessity of joint production will be recognized as factors in establishing jointness of cost. Both primary and secondary jointness would be included, tho the distinction would but be emphasized.

In the third place, the relation between joint costs and monopoly as affecting discrimination is important. Of course, the existence of monopoly will affect the practice of discrimination by a railway, and also affect the working of joint cost toward discrimination; tho that is far from denying a distinct tendency to discriminate, proceeding from joint costs as such. Joint costs invite discrimination, by making it easy to fall into, and difficult to prove. Indeed, a large body of supplementary expenses makes it nearly impossible to avoid discrimination.

As in the case of monopoly price, there is a tendency, already discussed, to allocate a large proportion to the portions of traffic or output that will bear it. But when monopoly is added to joint cost — and a partial monopoly, at least, is always added in the normal railway business¹ — the discrimination that is based upon joint cost is, as it were, aided and abetted. Under competition, the allocation of joint expenses will probably be less arbitrary than in the case of monopoly, for the degrees of demand will be more nicely graded and the necessity of joint production will be more severely tested. Monopoly gives power so to adjust supply in classes and amounts as not merely to discriminate but to discriminate so as to get maximum net returns. More than this, monopoly may induce a policy of independent sales for the joint products, and thus bring about what may be called absolute discrimination. If a dominant beef trust should desire, it might give meat away as a premium on hides. It can hardly be denied, then, that if monopoly in transportation could be removed, discrimination would be reduced. (This conclusion assumes that railway monopoly is not complete and unregulated. If monopoly be complete and unregulated, joint costs seem to have little social significance, for then discrimination is at the absolute discretion of the monopolist, with no competition or law to compel an allocation of costs.² But regulation or the existence of some competition may compel greater attention to costs in making prices, and consequently give importance to any element of jointness.)

¹ Indeed, monopoly had better be assumed, and the question raised be, not "What would joint costs amount to if there were no monopoly?" but "How do joint costs affect monopoly?" In a way, the question of what would be without monopoly, is futile, a railway being "naturally" a partial monopoly.

² It would always be desirable to the monopolist, however, to know costs and to allocate joint expenses most rationally; and two equally intelligent monopolists might, if in a joint-cost business, adopt different price schedules.

Vice versa, joint costs play a part in causing monopoly and in the fixation of monopoly price. When competing grocers cut sugar prices, we do not fear monopoly. We know that they know what the expenses assignable to their separate commodities are; that the procedure is not necessary; and that as soon as found unprofitable it will be dropped. But when competing oil, packing-house, and railway companies cut prices on their products, we become suspicious, and our suspicions are justified. In these latter cases, the products concerned are of necessity jointly produced at a joint expense, with the result that specific assignment of "cost of production" is impossible (and will not be attempted as long as not the most profitable course).¹ Moreover, different markets being involved, one product can be cut without demoralizing the market for the other. And, finally, according to our third factor in the constitution of joint cost, an increase in the output of one commodity or service (if possible) does not proportionally increase expenses. In fact, a part of the "fixed costs" of the industrial world are fixed, not because of technical conditions affecting the production of a single commodity, but because they are incurred on joint account for different commodities.² If, now, we add that in public-service industries government regulation, like competition, is made more difficult and uncertain by the existence of joint costs, the case is complete.

The case of local freight discrimination is too often ascribed to mere monopoly, as tho the railway were

¹ It is a condition essential to the existence of competition as a normal force that the competing units make some profits and that they be able to drop out in case they cease to do so. If the amount of the profit attributable to any particular operation is uncertain, and the production of any particular commodity or service is necessarily continued with some other product, the working of competition is obviously affected.

² It follows as a corollary that joint production is in some cases partly responsible for the existence of the condition of "increasing returns," with an obvious relation to monopoly.

merely recouping itself for competitive losses, from local points which it has at its mercy. But the fact that the local point is dependent upon a line that necessarily serves other points that constitute separate markets, is a fundamental part of the situation, *i. e.*, the fact that the monopoly is coupled with joint costs fundamentally affects discrimination. The railway, by law — to say nothing of economic necessity — has to serve both competitive and local points, and a considerable part of its expenses, both fixed and variable, are not in proportion to the volume of its traffic to the competitive point, being joint to both points; therefore it keeps up the competition, even tho cutthroat, and discriminates in assigning expenses.

Finally, it seems to be suggested by the analysis here presented that we are compelled to attack the problem of regulating joint costs if we are to regulate rates effectively — or, if you please, if we are to make the regulation of rates less necessary. In the first place, the scope and volume of joint costs can be reduced. For example, one suggestion has been that the scope of jointness may be reduced by narrowing the territorial extent of accounting units, thus reducing diversity of traffic utilities and operating conditions (Wisconsin Express Case).¹ In some cases, as transportation between large industrial centers, considerable traffic specialization might be possible within the same territory; as one railway system might handle the bulk of the through passengers, another the coal traffic, and so with any traffic of large volume that is similar in cost and value per ton. Already too, through control of securities, construction, and service, we are seeing to it indirectly that there shall be some necessity for the existence of each railway and its

¹ Merchants' and Manufacturers' Association of Milwaukee v. Wells, Fargo & Co. et al.; Railroad Commission of Wisconsin, May, 1913.

equipment; and this suggests that, as the necessity of the by-product is one factor in joint costs, so, by restricting railway expansion to such branch-lines, back-hauls, and attraction of new traffic, as social welfare warrants, we may reduce somewhat the range of economic necessity and of secondary joint costs.¹ Probably, however, the greatest progress must come in such improved accounting analysis that closer relationships between expenses and output or traffic will be ascertained. By experimentation, the fullest advantage will be taken of the variable element in variable joint expense, an element which has not as yet been fully and accurately segregated.

A residuum of joint expenses that can not be precipitated by any reagent will remain; and this, the writer believes, may well be taken in hand by regulative commissions, just as the construction of new lines and issuance of securities and forms of accounting have been taken in hand. It would seem that to leave in the hands of private interests power to allocate so large an amount of expenses as, in the case of railways, our analysis shows to be joint, would give too much power to discriminate — to levy a sort of tax, if that inexact analogy may be used. The writer looks forward to another occasion to try to prove that it is wiser to base rates upon utility and cost — which means to adopt a system of allocating joint costs — than to allow the operation of the "value (?) of-service" principle.

LEWIS H. HANEY.

UNIVERSITY OF TEXAS.

¹ Cf. above, p. 240.

CURRENCY DEPRECIATION IN TIME OF WAR

SUMMARY

I. Depreciation in general and currency depreciation, 253. — Rates of exchange and exchange values, 255. — Depreciation in the accountancy sense, 258. — Currency depreciation, in three senses, 260. — II. The practical tests of currency depreciation, 261. — III. Premium on gold, 263. — IV. Derangement of the foreign exchanges, 268. — Sterling, francs, marks, 270. — V. The behavior of prices, 273. — Indications for England, France, Germany, 276. — Summary, 278.

DURING the present war the belligerent nations have made great changes in their currency systems. In many cases there have been large issues of inconvertible legal tender. The expectation which these events engender, that the phenomena of currency depreciation must be with us in force today, finds abundant confirmation. It would seem there are three distinct, tho not altogether unrelated, tests for currency depreciation: (1) a premium on gold, (2) dislocation of the foreign exchanges, and (3) ascent of the general level of commodity prices. It is the purpose of the present essay to examine into the general nature of depreciation, the tests for currency depreciation and the relation among these tests, and the facts relevant to the present degree of depreciation of the currencies of Germany, France, and England.

I

DEPRECIATION IN GENERAL AND CURRENCY DEPRECIATION

As a term in economics and accountancy, depreciation should be taken to mean a decline in exchange value. We say a decline in *exchange value* rather than in *value* simply, because other types of value than exchange

value are not measurable with sufficient accuracy to justify reference to their rises and falls as appreciation and depreciation. It is doubtless habitual in much of our thought to conceive of subjective values (in the Austrian sense) and, I suppose, "social" values, as capable of ascent and descent, that is of growing "greater" or "less." But usage is certainly intolerant of giving the names *appreciation* and *depreciation* to their waxings and wanings. This, however, is a mere matter of terminology, from which we turn to consider certain doctrinal claims. In the literature on the standard of deferred payments, suggestions have been advanced from time to time, to the effect that money ought to maintain through the years a constant subjective value, or perhaps a constant utility, "total" or marginal; tho nothing in the Austrian theory of value gives countenance to these notions. By forcing words, we could restate these suggestions as being that money ought neither to *appreciate* nor *depreciate* in subjective value (or utility). But neither a theoretical definition of constancy in subjective value or utility, nor a statistical test for such constancy, has ever been devised. The best thought on the subject seems to be that in any case constancy in exchange value is the ultimate desideratum in a standard of deferred payments. In this paper, therefore, we shall not feel called upon to look beyond depreciation in exchange value.

Exchange value has been construed as a "ratio in exchange," as a "rate of exchange," as "purchasing power," and also as "the quantity of some other good commanded in exchange." While doubtless in some relations there is a choice among these competing conceptions of exchange value, the choice would seem to make no substantial difference in the practical interpretation of or application of the idea of depreciation as we

have defined it. "Rate of exchange" nevertheless would appear to be the best construction to place on the term exchange value, and this for the reasons so clearly set forth by Professor J. M. Clark in his recent article on "The Concept of Value."¹ At the same time there is no wisdom in surrender to any terminological doctrine which would interdict the use of the phrase "purchasing power." Imagine a state of affairs under which it would be unlawful, so to say, to speak of the fall in the purchasing power of gold since 1897. The purchasing power of any good is measurable only in its rate or rates of exchange, and it is as safe for the purposes of real analysis to think "purchasing power" as it is to think "rate" or "rates" of exchange.²

Any given exchangeable article has as many different purchasing powers or rates of exchange as there are other articles against which it may be traded. To follow C. M. Walsh,³ it has as many *particular exchange values* as there are other articles against which it may be traded. In addition to its numerous "particular exchange values," each article also has its *general exchange value* or purchasing power over the mass of commodities, or over goods in general. It is granted, however, that money is the only article whose general purchasing

¹ In the *Quarterly Journal of Economics*, August, 1915, pp. 663-673. "Ratio" in exchange implies an equal quantity of a positive value, so to say, in each of the two articles which exchange on even terms, tho it is very doubtful if this implication is intended by all who use the phrase. "Rate" of exchange is free from this implication, and according to best usage rather negatives it; and this is its virtue. Incidentally it might be suggested that the question of the existence of a positive value, or a "social" value, cannot be settled by inference from the fortuitous use of the term "ratio" by economic writers.

² Purchasing power ought not to be conceived as an independently subsisting entity, changes in which are first caused by some external conditions and then secondly propagated from the purchasing power to the rate of exchange. That is, a change in purchasing power is not a cause of a change in the rate of exchange, but *is* this change. It should be obvious that to prove that alterations of purchasing powers cause alterations of exchange rates, changes in purchasing power would have to be capable of independent measurement or determination, which is not the case.

³ *The Measurement of General Exchange Value*, pp. 10-13.

power is the object of much consideration in economic writings. It being conceded that an article's exchange values are plural in number, it is next to be observed that it is entirely possible for one of the values to depreciate and another simultaneously to appreciate. For an illustration dealing with two separate money values, we may assume that at the beginning of the Civil War, on a day when greenbacks were still at a parity with gold, a factory was worth say \$100,000, in paper or gold. But at some later date, when paper dollars had fallen to fifty cents in gold, the factory came to have a value we may suppose, of \$70,000 in gold, and one of \$140,000 in paper. This is a case where there is a *depreciation* of 30 per cent in one of the exchange values of the factory and an *appreciation* of 40 per cent in another. If we have an impression that only one of these movements is "real" and the other is "fictitious," that for instance the depreciation is genuine, but the appreciation is illusory, we are in error. There is no escaping the fact that the plant appreciated in its exchange value against greenbacks. This particular exchange value ascended. If it should be urged that in truth the factory depreciated and the greenbacks merely depreciated more, the reply is that this is correct provided we are careful to add "in terms of gold." But in terms of greenbacks the factory appreciated. During the year ending September 1, 1915, the British pound sterling appreciated in terms of francs, but depreciated in terms of dollars and also in terms of the mass of commodities in English markets. No one of these movements is less "real" than another, tho doubtless one may have a greater significance in certain relations than another.

It is also well to bear in mind that we do not disprove the existence of a given value depreciation when we quote special or proximate causes for its being. Suppose

a patriot says "the rise of food and other commodity prices in Germany is due to the scarcity of goods and is not due to the depreciation of the mark," or perhaps, "is not a case of depreciation of the mark." The answer is that the rise of the prices of goods is a depreciation of the mark in *terms of goods*, and the phenomenon does not cease to be because you explain why it is.

Enough has been said to make it clear that there may be more than one type of depreciation and more than one test for the phenomenon. The following tabulation is offered as showing the leading kinds of depreciation.

DEPRECIATION

I. Decline in the exchange value of goods or property rights.

- A. Depreciation in the accountancy sense; being a decline in the capital value of durable income-bearers measured in terms of money, and being a decline of a "particular exchange value."
- B. Depreciation of the mass of goods in terms of money; being the counterpart of a rise in the general purchasing power of money (see II C below).

II. Decline in the exchange value of a money unit.

- A. Depreciation of a given currency unit in terms of some other domestic money unit; being a decline in a "particular exchange value."
- B. Depreciation of a money unit of one country in terms of the money unit of another country; being a decline in a "particular exchange value."

- C. Depreciation of a given money unit in its general purchasing power over the mass of commodities which are circulated by it; being a decline in a "general exchange value."

The two chief classes in our tabulation are obtained by drawing the distinction between the depreciation (or its counterpart, the appreciation) of goods on the one hand, and the depreciation (or appreciation) of money or currency units on the other.

The first entry under I is (A) depreciation in the practical accountancy sense. In the interest of completeness, I may be pardoned for pausing to consider this type of depreciation briefly, tho it is not the main object of our inquiry. In the accountancy sense, depreciation is the decline in the value of durable income-bearers measured in terms of money. All goods are income-bearers under the definition of income advanced by Irving Fisher — a definition which it is to be hoped will meet with general acceptance. But only goods with an appreciable span of life ever have their income-values (or the value of the incomes they yield) and their capital values (or their own values when themselves transferred bodily or outright in exchange) separately appraised or determined. The value of a loaf of bread and the value of its yield or hire are not separable in practical life. It is only where the income stream or income item from goods or property is deferred a sufficient length of time to permit of the goods having different capitalized values at different points of time, as a matter of business practice, that we have depreciation or appreciation in the sense of accountancy. A note with three days to run is a property having a sufficient span of life to exhibit the phenomenon in question; tho under the current ways of reckoning its value happens to *appreciate*.

Depreciation or appreciation in the accountancy sense may be said to fall into three subdivisions, classified according to causes, as follows. (1) Value changes due to a change at some point of time in the interest rate used in capitalization. For example, a 5 per cent \$100 bond with twenty years to run, sold this morning on a 4 per cent basis (price or capital value \$113.59) may be sold this afternoon on a $4\frac{1}{2}$ per cent basis (price \$106.51); showing a sudden depreciation of \$6.08. (2) Changes due to a revision of estimate of the future income stream. For instance, a mine now assumed to be capable of yielding \$100,000 net a year for twenty years, on a 20 per cent basis (the rate of interest earned by the "sinking fund" taken at 4 per cent) has a capital value of \$428,265; whereas if today we alter our predictions and assume that it will yield an income of \$75,000 net for only fifteen years, its capital value under the new assumptions but on the basis of the same interest rate will become \$300,000 (approximately), showing a depreciation of some \$128,000, due to a revision of estimate of income. (3) We have declines in capital value taking place without either a change in the rate of interest or a change in the estimated total income stream. This is what might be called the standard type of depreciation in accountancy, being regularly present in the case of mines, factories, premium bonds and various other kinds of plants and properties whose incomes terminate after a time because of physical wear and tear or expiry of contractual obligation to continue payments. Examples are: a 5 per cent bond with twenty years to run, coupons annually, is worth \$113.59 on a 4 per cent basis, while five years later (with fifteen years to run) its value will have depreciated to \$111.12 on the same basis; or secondly, the mine above considered, yielding \$100,000 net for twenty years, worth \$428,265

on a 20 per cent basis (4 per cent on "sinking fund") will be worth but \$400,000 five years later, on the same basis. Where the future income stream is exceedingly problematical, as in so many cases in practical business life, various rules of thumb which do not involve a complete application of the mathematics of capitalization are adopted by the practical accountant to determine depreciation.¹

The second principal category of depreciation is a decline in the exchange value of a money or currency unit. As indicated above, three subsidiary cases are to be distinguished, as follows. (a) A decline in the purchasing power of a given currency unit over some other domestic monetary unit; that is, the decline in the value of one kind of money in terms of another kind of domestic money. For example, we have the fall in the purchasing power of the United States notes over gold dollars in our Civil War period (followed by their subsequent appreciation back to par). This is the case of the disappearance of parity among the different forms of currency in a national monetary system. (b) Second, we have the fall of the purchasing power of a given currency unit over some foreign money unit, such as the recent declines in the value of pounds, francs, and marks in terms of the American dollars, or in terms of the guilder of Holland. (c) Third, there is the descent of the purchasing power of a given money unit over the mass of goods in the market where this money circulates. In contrast with cases (a) and (b), this is one in which the depreciation takes place in a *general exchange value*. The latter conception, also called *general purchasing power*, has its difficulties, but it would seem it is with us to stay, certain attacks on it notwithstanding. Any sys-

¹ Such, for instance, are those explained in the chapter on depreciation in *Modern Accounting* by H. R. Hatfield.

tematic treatise on index numbers is, according to the view taken here, primarily a treatise on the methods of measuring *changes* in general purchasing power. There is no such thing as a figure representing general purchasing power at a moment of time without relation to other times. Merely changes (in time) or differences (in places) in this general exchange value can be indicated by index numbers. To deny the soundness of the conception of general purchasing power is to deny us the right to speak of the decline in the value of gold since 1897. Should an opponent urge that all that has happened since 1897 is a decline of the average (in some sense) of the numerous distinct rates of exchange of gold money against different goods,¹ I for one might vote to agree and also vote to persist nevertheless in speaking of a decline in the general purchasing power of gold. In any event, the last type of depreciation listed here is that described in the current terms of economists as a decline in the purchasing power of money over goods in general, or as a decline in the general exchange value of money, and described in the language of others by some lengthier and more complex phrase which they think best to use.

II

THE PRACTICAL TESTS OF CURRENCY DEPRECIATION

Confining the discussion henceforth to currency depreciation, it readily appears there are three practical tests or indexes of this style of depreciation, corresponding to the three classes of the phenomenon as given in our table.

¹ It appears to me that rates of exchange may assuredly be added and averaged. To be averaged (whether directly, or indirectly through the use of percentage or index numbers) they must of course be by nature capable of summation. Cf. Professor B. M. Anderson's contention that these rates cannot be added, in his paper on "The Concept of Value Further Considered," in this Journal, August, 1915, p. 686.

They are: (1) A premium on gold; an index of the depreciation, in terms of gold money, of some domestic representative money or of bank-credit currency. (2) A dislocation of a foreign exchange rate; an index of the depreciation of one of the national currencies represented in the rate, in terms of the other; also an index of the appreciation of this other in terms of the one. (3) A rise of the index number for the general price level; an index of the depreciation of a money unit in its general exchange value in terms of the mass of commodities.

A given currency unit may depreciate (or appreciate) in any one of the three values just indicated. By currency is meant any common medium of exchange, including bank-credit as well as representative moneys. When all forms of currency are at a parity in a country, we do not have it brought home to us that there are really several distinct currency units. But a derangement of the monetary or banking system discloses their existence. A premium on gold in terms of government or bank notes is a familiar historical phenomenon. But a premium on gold in terms of bank-credit may exist without a disturbance in the gold-value of circulating notes. For an illustration we have the 4 per cent discount on certified checks in New York reported for a few days in 1907, at a time when governmental paper money and national bank notes showed no such discount. For a brief interval it took something like \$104 of certified checks to procure \$100 of paper money.

III

PREMIUM ON GOLD

The writer now desires to offer such facts as he has been able to gather pertaining to the present depreciation of the mark and franc and pound sterling. Considering in order the three tests of depreciation, we take up first the appearance of gold premiums.

At the outset it is necessary to distinguish between (a) the premium on gold proper and (b) the inferential premium on gold disclosed in a dislocated foreign exchange rate. Not infrequently we are told that there is such and such a premium on gold in a given country, when what is meant in fact is that there is in this country such and such a premium on exchange on some gold-standard country. In other words, a premium on gold is inferred from a premium on exchange. There is no essential error in this inference, except in times of acute disturbance, but the *facts* of the inferential premium on gold are facts of the foreign exchange rates, and will be given as such when we come to the subject of the present position of the exchanges. By the premium on gold proper is meant a premium exhibited in actual domestic trading of depreciated currency against gold coin or bullion, such as took place in the Gold Room in this country. Thus if the price of a gold dollar, or of enough bullion to make a gold dollar, is \$2 of paper, there is a premium on gold proper, and the premium is 100 per cent. As regards gold premiums proper in Germany, France, and England, so far as the writer's knowledge extends, there are no facts, or better perhaps, the only facts are that no premiums on gold whatsoever have been quoted in these countries.

This is the case, even tho currency conditions in Germany and France since the outbreak of the war have been of a character especially adapted to produce gold premiums. Currency disturbances in Great Britain have not been so great, but they have been sufficient to occasion, or if you prefer, to permit, a heavy decline in the price of sterling exchange in leading neutral countries, and thus to create an inferential premium on gold in England. Germany, on August 4, 1914, (1) annulled the obligation of the Reichsbank to redeem its notes in gold or anything else, while leaving this currency in possession of the legal tender power which had been conferred upon it in 1909; (2) made the notes of other banks of issue redeemable in notes of the Reichsbank; and (3) made Imperial Treasury Notes irredeemable and legal tender.¹ At about the same time (4) the Imperial Loan Banks (*Darlehnskassen*) were created to issue their notes by way of loans to individuals on many types of collateral, these notes being irredeemable tho not possessing the legal tender power. This newly created note was made eligible to be counted as part of the one-third reserve carried by the Reichsbank against its own notes. Without expanding on this subject, we may safely assert that a more whole-hearted resort to irredeemable legal tender paper than Germany's can hardly be imagined. The German plan of procedure seems to be essentially this. German gold, as far as the authorities have been able to draw it out of circulation and sequester it in the vaults of the Reichsbank, has had its relations with the actual local currency of the country completely severed, and it now exists as a special metallic fund which may be

¹ Cf. "Germany's Financial Mobilisation," by Ludwig Bendix, in this Journal, August, 1915, pp. 724 et seq.

These laws are also discussed in the "Report of the Imperial Bank of Germany for 1914," a translation of which is published in full in the *London Banker's Magazine* for October, 1915, pp. 513-544.

drawn upon so far as necessity compels for the purposes of foreign purchases. It is doubtless the hope of the Empire to save as large a part of this fund as possible for use in rehabilitating the gold standard after the war.

In spite of the extraordinary currency situation in Germany no premium on gold has ever been published in that country, so far as the writer can learn, since the beginning of the war. The following news item, however, appeared in the *Analyst* (New York) for December 21, 1914 (p. 484), in the form of a communication dated, Berlin, November 30th:

While there was no gold premium in the internal market, recently a tendency has manifested itself among speculators to try for gold by offering a small premium. This called forth a drastic decree of the Bundesrath which prevented, under severe penalties, both the offering of a premium for gold and the exporting of gold.

In France (1) the notes of the Bank of France were made irredeemable and given full legal tender power, and (2) the limit upon the issue was raised from 6,800,000,000 fr. (the limit in force before the beginning of the war) through several steps to 15,000,000,000 fr. On July 30, 1914, the actual issue of the Bank of France stood at 6,683,000,000 fr., but has since ascended to the very large figure of 14,188,000,000 fr. (November 11, 1915). Gold export has been prohibited by French law, altho, no doubt, ways have been left open for export by the Bank of France when the authorities deem such action expedient. The writer has been unable to find any quotation of a premium on gold in France whether in terms of notes or of bank deposit-credit. Nothing has been found beyond such an isolated and uncertain item as the following, from the *New York Times*, August 1, 1914, p. 3, col. 3, (published at the very outbreak of the war). "Paris, July 31, 1914. Gold was

at $1\frac{1}{2}$ per cent premium here today. English sovereigns were selling at 28 fr. each, instead of the normal rate of slightly more than 25 fr." If the sentence about English sovereigns means what it says, it signifies that British gold coin sold in Paris at the rate of 28 fr. per pound sterling. This would establish an actually present gold premium of about 11 or 12 per cent. If the sentence means that drafts or telegraphic transfers on England were selling at 28 fr. per pound, this would indicate what we have called an inferential gold premium of the same amount; but this would be one of the cases where an inferential premium might be in a sense fictitious. It might be added that the *Annalist* (N. Y.) for August 3, 1914, p. 140, contained the following statements, in substance: "Gold went to a premium, speaking generally of western Europe. . . . Foreigners in France have been paying fantastic premiums for gold."

In England the only currency change caused by the war (unless we should speak of a moratorium as a currency event) was the issue of the new governmental paper called Currency Notes, created by Act of August 6, 1914, and made legal tender. These notes are redeemable in gold at the Bank of England, from a special gold fund carried by the government with the Bank for the purpose. At the start the chief object in issuing them appears to have been to lend them to the banks as an emergency currency, but direct aid to banking institutions has ceased to be the dominant aim long since. On November 27, 1915,¹ they were outstanding in the sum of approximately £90,000,000 (the highest figure reached up to that date) and at this time only £438,000 were out as advances to banks. The chief cover then consisted of

¹ The figures to follow are taken from the regular weekly statement of the Currency Notes Account appearing in the *London Economist*, in this case in the issue for November 27, 1915, p. 910.

- (1) £28,500,000 coin and bullion at the Bank.
- (2) £44,620,000 of pledged government debt.¹
- (3) £17,114,000 government deposit with the Bank.
- (4) £438,000 advances to banks repayable by them.

Respecting the status of the Bank of England note, it appears that the Bank Act was suspended just before the governmental Currency Notes were issued, and that the Bank issued a certain amount of its notes without deposits of gold, but retired them before its weekly statement of condition was made up. The first temporary "uncovered" issue was to serve as emergency currency, but was promptly replaced by the new government notes. In no statement of the Bank of England since the beginning of the war has there been evidence of the taking advantage of suspension of the Bank Act.

The writer has discovered no publication of quotations of a premium on gold, or on legal tender, in England, tho an inferential premium exists because of the depressed rates for sterling in New York and Amsterdam. The premium implied here might be, and probably is, one *on* gold and notes both, *in terms of* bank deposit currency or bank-credit. The most plausible hypothesis for the facts known to us is that there is an extra-legal and moral union of the banking interests of Britain, which has adopted the program of paying out notes (convertible at the Bank of England in gold) in ordinary cases on demand, while preventing the gathering of gold in large quantities for unregulated private export. England has exported much gold to America, but apparently under the control of central authorities.

¹ What debt is unknown, except that it is not present war debt (according to the statement in an unsigned article in the *Annalist*, N. Y., for December 28, 1914, p. 509).

IV

DERANGEMENT OF THE FOREIGN EXCHANGES

We come next to the foreign exchange rates as evidence of depreciation or appreciation among national currencies. It may be called appreciation as well as depreciation, because the depreciation for instance of francs in terms of dollars is quite as much a case of appreciation of dollars in terms of francs. Or, to take another instance, the greater depreciation of francs than pounds in terms of dollars is also a case of appreciation of pounds in terms of francs. The latter statement may be made not only as an inference from the greater relative decline of francs than pounds in terms of dollars, but is also proved by the direct rates of exchange between France and England. If we suppose that back of these relative movements lies a situation in which dollars have neither appreciated nor depreciated, while pounds have depreciated some, and francs more — this supposition being probably correct enough if we measure all three currency units in *terms of gold* — we must also remember that whereas the pound has depreciated in terms of dollars and of gold, it also has appreciated in terms of francs.

A few words of explanation are needed on the precise meaning of a percentage figure for exchange premium (or appreciation) and exchange discount (or depreciation). The percentage either of premium or discount is commonly measured from the exchange par, or more precisely the mint par, as base. An argument could be made in favor of measuring the abnormal premiums and discounts in which we are now interested from the upper and lower gold points respectively, calculating these on the basis either of ordinary or of present ex-

traordinary costs of specie shipment. But we may be content not to discuss this refinement and to measure simply from the mint par. The results from the two methods will not differ greatly. Thus a premium of 9 per cent calculated by our simpler method might become one of from about $8\frac{1}{2}$ to $8\frac{3}{4}$ per cent, calculated by the other method. When demand sterling is at 4.87 $\frac{1}{2}$ in New York, it is at a premium of $\frac{1}{2}$ per cent, according to the method we are adopting, altho it is not above the ordinary gold point. Incidentally, it is common for English money articles to speak of such a rate as 4.87 $\frac{1}{2}$ as exhibiting a "premium" on sterling.

The premium shown in a rate is the excess of this rate above par divided by par, the result being multiplied by 100 to make it a percentage; and the discount is the deficiency of a rate below par divided by par, and multiplied by 100. The consequence is that with a given rate of exchange (other than par) between two national units, the percentage of the premium on the one is *not* the same as the percentage of the discount on the other. Thus suppose Paris quotations of New York exchange and New York quotations of exchange on Paris were to agree (as they should owing to arbitrage) in making \$1 the equivalent of 10.36 francs (par being approximately 5.18 or half this rate), the premium on dollars, most prominent from the viewpoint of Paris, is 100 per cent, while the discount on francs, most readily seen in New York, is 50 per cent. Dollars have appreciated 100 per cent in terms of francs but francs have depreciated only 50 per cent in terms of dollars. In a word, the percentage figures for appreciation and depreciation have the relation of *reciprocals*.¹ (A decline of francs to a

¹ That is, 100 per cent premium means a value of 200 per cent, and 50 per cent discount means a value of 50 per cent. Two hundred per cent (or 2) and 50 per cent (or $\frac{1}{2}$) are reciprocals. When the premium and discount percentages are small, they become almost the same. Thus corresponding to a 5 per cent premium there is a discount very close to 5 per cent.

value of zero dollars converts into a discount of 100 per cent.)

The movements of the relative values of the currency units of present interest to us, may best be exhibited by giving tables of the exchange rates in New York or Amsterdam, the two leading neutral exchange markets. Fuller statistics are available to the writer for New York. As a matter of interest it may be said the exchange rates between these two centers have been perturbed to no small degree during the war. About the middle of October, 1914, when our exchange market had just recovered from complete demoralization, and before which time all published quotations are reported as nominal, New York sight rates on Amsterdam touched .42½. Rates at later dates are shown below.

NEW YORK ON AMSTERDAM

(Cents per Guilder. Par approximately .402)

Date	Rate	Premium or Discount on Guilders
Middle of October, 1914	.42½ (highest)	5.7 % premium
End of May, 1915	.38½ (lowest)	3.6 % discount
End of December, 1915	.43½ (highest)	7.9 % premium

Taking now the American dollar as an arbitrary standard of measurement of the appreciation and depreciation of pounds, francs, and marks, let us examine certain figures from the New York foreign exchange market. Cable rates are to be preferred when obtainable for all dates, but sight rates may be substituted with little harm as the gap or "spread" between the two rates ordinarily does not exceed one tenth of one per cent (it is perhaps unnecessary to state that the superior price obtained for cable transfers has no connection with telegraph charges).

STERLING. (Par 4.8665)

Premium or Discount	Rate for Cables	Date	
Premium, 44 %	7.00	1914 First week in August	The highest recorded rate for the week. "Small transactions" took place at this figure.
Premium, 28½ %	6.25	(Same)	A larger number of transactions took place at about this figure.
Premium, 4.2 %	5.07	Aug. 28	Market begins to settle down on this level. Henceforth, a long decline with moderate upward reactions at times.
Premium, 1/7 of 1 %	4.87½	Nov. 13	Below ordinary gold export point.
	4.86½	Dec. 24	Par (approximately).
Discount, 7½ %	4.50	1915 Sept. 1	Lowest point in the day during an exchange "flurry" or panic.
Discount, 2.6 %	4.74	End of Dec.	

Noteworthy events exerting an influence on the course of sterling were the formation of the gold pool in New York, the visit of the Anglo-French loan commission, and the subsequent making of the Anglo-French loan of \$500,000,000.

The following shows the rates for New York exchange on Paris.

FRANCE

(Par 5.1826 francs per dollars, or 19.3 cents per franc)

Premium or Discount	Rate in Cents	Sight Rate as Quoted	Date	
Premium, 5.7 %	20.4	4.90 ¹	1914 Period till middle of October	During this period all rates are quoted "nominal." The highest and lowest of these nominal quotations are given.
Premium, 1.2 %	19.53	5.12 ²		
Premium, 1.6 %	19.63	5.09 ¹ ²	Week ending Nov. 27	
Discount, 14.9 %	16.58	6.03 ²	1915 Sept. 1	Decline fairly steady with moderate upward reactions.
Discount, 11.6 %	17.07	5.86 ²	Last week of December	

Next, the course of marks in New York.

MARKS.

(Par 95.284 as rate is quoted, or 23.8 cents per mark)

Early Period	Rate	Premium or Discount
No quotations till middle of August, 1914		
"Nominal" quotation till the week ending October 9, 1914...	97 (highest)	1.8 % premium
Range in period of nominal quotation.....	91 $\frac{1}{2}$ (lowest)	3.7 % discount
September 1, 1915.....	80 $\frac{1}{2}$ "	15.4 % "
Last week in December, 1915	75 $\frac{2}{15}$ "	20.7 % "

¹ Highest.² Lowest.

Summarizing, we have the following on the rates of depreciation, in terms of dollars, at the close of 1915:

British pound sterling	2.6%
French franc	11.6% ¹
German mark	20.7%

V

THE BEHAVIOR OF PRICES

The available facts regarding the movements of prices must be brought under review, if we are to apply the third test for currency depreciation. Before the war, systems of index numbers were being maintained and results were being published, somewhat tardily in cases, in nearly all of the countries now engaged in the conflict, as well as in the three leading ones with which this article deals.² In England, the *Statist* and the *Economist* numbers have been continued in the usual way even since the outbreak of the war. In France and Germany, however, so far as the writer is aware, no standard or other index numbers have been published for dates subsequent to July, 1914. Some facts, nevertheless, have been secured respecting prices in these countries, and this material will be presented for what it is worth.

Speaking first of England, it seems unnecessary to give the index numbers month by month since July, 1914. Suffice it to say this series would show a practically uninterrupted and withal very steady advance of prices. A brief table of index numbers is presented beneath.

¹ Swiss francs stood at a trifle above par in New York on January 11, 1916.

² See Bulletin of U. S. Bureau of Labor Statistics, No. 173, July, 1915, on this subject.

ENGLISH PRICES

	Index Number as Published		The Same, Recast with Prices of July, 1914 as Base ¹	
	Economist	Statist	Economist	Statist
Economist's Base:				
1901-05.	100.0	....	....	....
Statist's No.:				
For year 1900. ....	....	75.0	....	....
For year 1901. ....	....	70.0	....	....
End of July, 1914.	116.6	82.4	100.0	100.0
End of October, 1915.	153.2	110.0	131.4	133.5

If we accept these figures, we may say that during the first fifteen months of conflict, English prices rose from 30 to 35 per cent. Prior to the war, as the table shows, the *Economist's* number indicates a rise of prices of about 16 per cent in a decade or more. The *Statist* number for 1901 is 70, and for July, 1914 it is 82.4, implying a rise of about 18 per cent ² in thirteen years. It would appear, then, English prices have risen about twice as far in fifteen months of war as they rose in twelve or fifteen years of peace immediately preceding the war.

With respect to French prices, difficulty has been experienced in finding data sufficient to support even the roughest attempt at an index number. Ephemeral literature contains many isolated and uncertain references to recent prices in Europe, virtually always too fragmentary for use. The *Bulletin of the United States Bureau of Labor Statistics*, No. 170, May, 1915, gives many prices taken from the markets of numerous countries, for the autumn of 1914; but the best data on

¹ The base is here changed by the crude method of taking the general number for July, 1914, as 100 in each case, without unbuilding and rebuilding the system. The error is probably small.

² Calculated roughly, 82.4 being 118 per cent of 70.

prices in France which the writer has discovered for the purpose of making a rough index number, are found in a letter from the Paris correspondent of the *London Economist*, published in that paper, November 27, 1915, p. 900. The Prefecture of Police of Paris gave out the prices of thirteen articles (eleven foods and coal and petrol) for the year 1913 and for November, 1915. Taking 1913 prices as bases, the writer has calculated the index number for the prices of each commodity as of November, 1915. The "unweighted" (*i. e.*, equally weighted) arithmetical average gives us a general index number of 149. The figures, such as they are, follow:

FRENCH PRICES

Ante-bellum price number (1913) ¹	100
Number after 15 or 16 months of war	149

This indicates a rise of prices of about 50 per cent and a decline in the purchasing power of French currency by $\frac{1}{3}$, or to 66 per cent.

In the case of Germany we find data somewhat more satisfactory. The Imperial Statistical Office (*Kaiserlich-Statistisches Amt*) has published regularly since the beginning of the war the retail prices in Berlin of some twenty articles of food. An index number has been constructed from these prices for the *Labour Gazette* of the British Board of Trade. In calculating this number the different commodities are weighted according to their importance in consumption as shown by German data. The index numbers for different dates have not been found in any one place, but gathered chiefly from the pages of the *Journal of the Royal Statistical Society*.²

¹ Prices for these same articles at some time later than 1913, but still prior to the war, are not given.

² See especially the issues for January, 1915, p. 115; March, p. 326; July, p. 644.

INDEX NUMBER FOR RETAIL FOOD PRICES IN BERLIN

1914 July.....	100.0	1915 January.....	131.0
August.....	113.3	February.....	142.6
September.....	110.5	March.....	149.0
October.....	116.4	April.....	156.5
November.....	120.9	May.....	165.3
December.....	126.1	June.....	
		July.....	169.6
		August (or September ?).....	175.3

An "unweighted" general index number calculated by the writer from Berlin prices as made public by the Imperial Statistical Office and reported in the *Bulletin de Statistique*, Paris, July, 1915, p. 78, shows a rise from May, 1914 to May, 1915 of 88 per cent.

The following summarizes what there is to offer regarding prices in the three countries which we are studying.

ROUGH APPROXIMATIONS FOR THE THREE COUNTRIES¹

	Ante-Bellum Prices	Prices in the Autumn of 1915	Indicated Per- centage of Fall in Purchasing Power of Currency Unit
England (<i>Economist</i>)	100	131.4	24 %
(<i>Statist</i>)	100	133.5	25 %
France	100	149.0	33 %
Germany	100	175.3	43 %

It will suffice to indicate briefly the trend of American price data. The New York *Annalist* numbers run as follows:²

¹ More exact information as to dates is given in the preceding separate tables for each country.

² As read from a chart printed in the *Annalist* for January 3, 1916, p. 24.

		Percentage of 142
June, 1914.....	142.0	100
In September, 1914.....	161.0	113 (highest)
End of December, 1914.....	147.0	103.5
In September, 1915.....	136.0	96.0 (lowest)
End of December, 1915.....	149.0	105.

It might be said that for two years prior to June, 1914, the *Annalist* number maintained a level quite close to 142.

The Bureau of Labor Statistics index numbers for retail prices of food in the United States, brought down to December, 1914, are as follows: ¹

	Percentage of 99.2	
March, 1914.....	98.3	...
June.....	99.2	100
July.....	102.3	...
August.....	106.6	...
September.....	107.1	108
October.....	104.9	...
November.....	104.7	...
December, 1914.....	103.9	105

The evidence — obviously fragmentary — respecting the depreciation of currency in purchasing power over commodities generally may be assembled as follows:

	Ascent of Prices During the War to the Close of 1915	Decline in the Purchasing Power of National Currency Units
England.....	33 %	25 %
France.....	50 %	33 %
Germany.....	75 %	43 %
United States.....	5 %	5 %

The fact that the figures assembled above are very crude, and are perhaps of but transient value, does not restrain the writer from throwing together the following:

¹ From Bulletin No. 156.

SUMMARY OF MEASURES OF DEPRECIATION ¹

	British Pound Sterling	French Franc	German Mark	United States Dollar
Depreciation as measured in gold premiums proper . . . . .	..	No quo- tations	..	..
Depreciation as measured in the foreign exchange rates against the American dollar .	2.6 %	11.6 %	20.7 %	..
Depreciation as measured in the rise of commodity price .	25 %	33 %	43 %	5 %

This paper has endeavored to make clear the nature of depreciation and to describe the tests for currency depreciation, and finally to measure in a general way the present degree of depreciation of three important national currencies, by applying these tests to such data as are at hand. The most interesting theoretical problem which forces itself upon one in connection with this subject, is the question of the relations existing among the tests for currency depreciation — what we ought to expect in the way of harmony or correlation between the three. To this question it is the writer's hope to address himself in the future.

A. C. WHITAKER.

STANFORD UNIVERSITY.

¹ The various figures in this final summary are good for scattering dates close to the end of 1915. Perfectly synchronized data are not available.

NEGLECTED FACTORS IN THE PROBLEM OF NORMAL INTEREST

SUMMARY

I. The nature of capital. Capital defined pragmatically as that for which interest is paid, 280. — Relation to entrepreneur function, 281. — Capital is value, 282. Relation to "rent," 283. — II. The supply of capital, 284. — "Discounting the future" an erroneous explanation, 285. — Motives looking beyond the individual life, 286. — Value often produced specifically for capital use, in order to secure social position and power, 288. — The supply curve of capital, 291. — III. The demand for capital, 292. — There is "specific productivity," 293. — In what sense, 294. — Convertibility of capital into rent-bearers, 295. — Summarized proposition, 298. — IV. The equilibrium of supply and demand, 299. — The conventional equilibrium of supply and demand refers to a unit of time only, 300. — Its application to capital unsound, 301. — Two separate problems, 303. — At a particular moment, no equilibrium, but an equilibrating action, 304. — The long period trend represented in three dimensions, 306. — In what sense the reasoning rests on "static" assumptions, 307. — A normal equilibrium of supply and demand and a normal rate of interest are wholly hypothetical, 309.

By no means all of the points considered in this paper deserve the appellation of "neglected"; but in attempting to present some that do seem to merit more notice than they have received, it seems advantageous to give them a setting in a somewhat systematic view of interest theory, even tho the procedure involves a certain amount of restatement of familiar matter. In a study covering so large a field, moreover, there can be no thought of definitely separating the new from the old, or giving credit for the latter portion where it is due. This may serve to excuse its manifest critical and historical shortcomings.

A systematic discussion of the interest problem falls naturally into four parts, relating respectively to the nature of capital and to the conditions of its supply, its demand, and of equilibrium between the two. About all of these issues controversy has raged, nor can agreement be claimed today in regard to a single one of them. This study, which presents a method of attack avoiding some of the most important confusions and occasions of misunderstanding and disagreement, is submitted in the hope that it may make some small contribution toward realizing in this troubled field the grand desideratum in economic theory, a body of sound and accepted doctrine in the fundamentals of the science.

I. THE NATURE OF CAPITAL

As a means of side-stepping the endless controversy on this head, we propose to define capital in pragmatic fashion, with reference to the problem in which we are interested. Capital, then, is *that for the use of which interest is paid*, and the proper way to get an understanding of its nature is to examine the function in the industrial world of the institution of lending at interest.

In the first place, it is clear that no such procedure as lending at interest is inherently necessary to the conduct of the production, distribution and consumption of wealth under the competitive conditions of highly developed society. Every business operation might be carried on, with a difference in the forms alone, by the purchase and sale, or rental, of actual productive property. With the exception of the inconvenience and loss involved, every detail of the production and exchange of commodities might be as we see it today without an interest contract in the world.

Why do men lend their "money" instead of buying or constructing productive agents and renting these to business men? It is for the same reason that they do not so acquire productive property and operate it themselves, thus becoming entrepreneurs on their own account. The ownership of concrete forms of property involves both close study of the business situation and responsible business action. The same motives which lead to the one differentiation of function, the renting of productive agents instead of operating them in person, lead to the other, the transfer of ownership as well as management, to the same entrepreneur. The individual who fixes wealth in a definite form largely determines the use to which it is to be put, and is one of the principal responsible directors of the productive system as a whole. He must put forth the effort to acquire the necessary knowledge as to the relative commercial prospects of the different available uses, and then must take the consequences, for good or for ill, of "committing" it to the form and use decided upon. He determines the character of productive operations and takes the "risk"¹ involved; he is an entrepreneur.

The institution of lending capital at interest exists, therefore, for the purpose of carrying as far as possible the specialization of the entrepreneur function.² This

¹ Risk is not a good word, because of its use in connection with insurance, an entirely different sort of thing. Its use to designate the entrepreneur function is doubtless both cause and effect of the confusion which reigns in regard to the theory of entrepreneurship and profit. "Responsibility" is a better word, as it does not convey the idea of a known chance, with which the insurance company but not the entrepreneur is concerned, but of a decision involving uncertainty, and the consequences of which must be taken by the one who makes it.

² The specialisation is not perfect, even then, for two reasons. First, some property has to be the security for the return of the loan, and hence the use to which the capital is put is not a matter of complete indifference to the lender. He must still keep an eye upon the borrower and his business (management) and assume corresponding chance of loss (responsibility); he is still entrepreneur to that extent. Second, practical exigencies demand that the loan be arranged definitely for a considerable period of time.

view reveals at once the practical nature of capital, the thing lent. It is a *claim or title to a fixed amount of wealth, not involving the ownership of any particular piece or kind of property*. In the strict sense, *capital is value*. It may be embodied in anything having value, and conversely anything possessing value may represent that much capital. The owner of any concrete property owns capital to the extent of its market value at the moment; this is the amount he is free to withdraw for other uses, and the amount he can lend to another business man not interested in that particular form of enterprise. But as a matter of convenience in making transfers (the purpose for which capital exists) it will usually be embodied in money or bank credit. Moreover, since value is necessarily measured and expressed in terms of money, and since the term money is loosely used in everyday speech as a synonym for wealth in general, no confusion need arise from thinking of capital as money. It must of course be money in this loose popular sense and not in the technical meaning of the circulating medium. There is just one limitation necessary; capital is money, or wealth, or value, thought of in its loan aspect.¹

Capital being merely wealth in general, interest is the income from a loan of a claim to a certain amount of

Here again the lender exercises judgment and takes responsibility with reference to changes in conditions in the interim. Such a time contract in fact becomes property, subject to fluctuations in value, as seen in even the best corporation and government bonds. The only lender who is purely a capitalist is the lender "on call" at absolute security, if any such lender exists. He alone can get back the original amount of "value" at will.

¹ There is of course abundant precedent for this formulation of the capital concept. Thus Professor Fetter is at least very near it in, "economic wealth whose quantity is expressed in a general value unit." (See this Journal, vol. xv, p. 44.) Mr. F. B. Hawley, too, has called capital "unexpended purchasing power," a polysyllabic name for plain "value." (Enterprise and the Productive Process, p. 5.) Again, this is clearly what is meant (though not said) by Professor J. B. Clark, who considers it as a sort of metaphysical essence persisting through changing material forms. This implication of Clark's phraseology has been pointed out by various writers, as by Fetter in the article referred to. Both the leading schools of interest theorists are divided on the subject, Fisher and Böhm-Bawerk on the one hand, and Carver on the other, insisting that capital consists of concrete productive agents.

value, as distinguished from the income of any piece of actual property. The income of a particular piece of property is called rent. From the standpoint of many problems, rents may profitably be classified according to certain characteristics of the agents to which they accrue, particularly their durability. Professor Marshall has called the income from the less durable agents "quasi-rents," but the distinction is necessarily shifting and arbitrary, and more complex classifications are doubtless useful for special purposes. From the standpoint of the interest problem, the only distinction of significance is that between the income of *any* piece of property as such and that of a loaned claim on a certain amount of unspecified wealth; the one is rent, and the other interest. X

Under the impossible conditions of ideally perfect competition,¹ where time and space were annihilated and universal omniscience prevailed, the two incomes would be equal; the rent on any agent would be the same as the interest on its value. But under any real or possible circumstances there will be a normal difference between rent and interest, constituting the income (profit) accruing to the entrepreneur function of fixing or "committing" value.

II. THE SUPPLY OF CAPITAL

Our concern under this head is not of course the amount of value or wealth in existence, but the supply available for lending, the amount offered on the loan market. Two questions must be dealt with, (1) the

¹ Not necessarily the "static state" of Professor J. B. Clark and others. Perfect competition would indeed exist in the static state, but because static conditions involve perfect knowledge of the situation by all competitors. It is the fact of omniscience, however, which is the prerequisite to perfect competition, and if this were realized in any other manner, no amount or kind of change would disturb the operation of ideal economic law. Changes foreseen in advance are discounted or capitalized in advance, and are a part of the static situation to which business men adjust their conduct.

diversion of wealth from other uses (immediate consumption) to the loan market, or *saving*; and (2) its creation or production on purpose for this use. Altho the second factor is unquestionably much the more important of the two, discussion and controversy have centered mainly around the first. It seems to be assumed that an offer to lend involves only the question of when consumption is to take place, whereas in fact the larger part of capital by far is certainly the result of other motives than the desire to consume (merchantable) commodities at any time.

X (1) It may be that an appreciable amount of capital results from the conscious postponement of consumption; no doubt some does originate in this way, tho the relative significance of this source must be a matter for grave doubt. But for its historic interest, if for no other reason, some notice must be given to the notorious problem of whether men "discount the future." The question has suffered much from lack of proper statement. When correctly formulated, a definite answer will be found to be neither possible nor, if it could be obtained, of any particular significance for the theory of interest. It can be intelligently discussed, like most scientific questions, only on the expressed or implied supposition that "other things are equal." "Other things equal," it would seem to be largely a question of human rationality, as it is hard to see how a rational being can be influenced by the mere time of an occurrence. This must give us a bias in favor of rationality, in case of doubt, such an assumption being necessary to intelligent discussion of human conduct in the light of motives. Of course savages and children are lacking in foresight, and recklessly improvident; but could competitive industry (not to mention economic science) be built on the basis of such behavior? The way the

question is generally asked, other things are anything but equal. If it is suggested that I postpone this year's consumption of food until next year, the difference in "other things" is considerable, inasmuch as I should be alive now and dead then; in other words, the alternative is non-existent. It goes without saying that many things must be taken when they are offered, the pleasures of life enjoyed while we live and those of youth while we are young, or not at all.

In order to afford a basis for an intelligent guess on the question of time-preference in consumption, it may be worth while to suggest a situation in which other factors than time should be as nearly as possible eliminated. We may without doing violence to reality overlook the inevitable chance of death, as it is no doubt virtually ignored by most people in the prime of life and with reference to moderate intervals of time. Let us then, imagine a man in good health stranded on a desert island with slightly less than a comfortable supply of food to last one year, at the end of which time we suppose him to know that a ship will pass by and take him off. Would a rational man or the "average" man, gormandize in the early part of the period to starve at its close? I submit that the ordinary human being would distribute his rations with painstaking uniformity. He might take occasional spurts of recklessness and parsimony respectively, but on the whole he would be at least as likely to favor the latter end of the interval as the earlier.

But we need not appeal to imaginary situations. How *does* the normal individual apportion his enjoyment, including his leisure, throughout life, when free to choose? Does he exhaust the resources of credit and insurance in anticipating his future earnings so as to live high in his younger years to skimp and slave in

age if it come? Has anyone heard of a considerable demand for annuities decreasing with advancing time? What proportion of individuals buy even regular life annuities? The significant thing in the capital market is the psychology of the social class from which capital accumulations actually come. Our large producers, who are to a still greater degree our large savers, not only do not buy annuities, but invest enormous sums in life insurance. They not merely invest the bulk of their income in perpetual income property, but they habitually reinvest a large part of the return from these investments in the same way, and so on, postponing consumption perpetually. If it were a question of time-discount at all (which it is not), we should have to say that these people discount the *present* and at a prodigious rate.

The truth is that economists blind themselves to the facts in applying the ordinary economic motives, the motives of the drudge at the margin of subsistence, in the field of capital at all. Here production is not in order to consumption, but if anything the other way. The thing desired is *possession*, which is a categorically different proposition. The motivation is not economic in the ordinary sense but "sociological."

But, whatever might happen if other things were equal, they are not equal. It is possible to invest surplus value product and secure an income from it, and it may be of interest to note the bearings of this fact on time-value calculations — if any are ever carried out. Whatever would be the natural distribution of consumption without interest, those who make such calculations will shift their consumption forward from the "natural" just as far as the reward offered seems to them to justify. By giving to a skilled actuary his psychological estimate of the disutility of distortion of his

income-flow, measured in terms of its total quantity, one could find out just what kind of an annuity to buy to secure the maximum *opphelimité*. But is this shift, or the fact that it stops when it does, an evidence of future discount? Who would not prefer a dollar today to one a year hence to the extent of five cents, when he could invest the dollar in gilt-edge securities at that rate? Time-preference must be measured from a basis of uniformity of distribution of consumption in time. To attribute interest to the discount of the future is (among other worse errors) to commit the fallacy of interchanging cause and effect.¹

So much for the mere fact of time value in consumption. The next point which calls for emphasis is that the whole question can have nothing or next to nothing to do with the social supply of capital. Economists have a way of jumping from the inward soul of man to social behavior with an uncritical precipitateness which is always perilous, and which here leads to the gravest errors. It would seem obvious, on mere statement, that *no* distribution of consumption in time on the part of the individuals composing society can lead to a net accumulation of capital in the society as a whole. Net accumulation can only result from an average excess

¹ I regret the impossibility of extended critical references at this point. The position taken will be found more or less clearly indicated in many writers, especially Carver, Davenport, and Taussig, tho all three conclude by admitting the validity of the time-value phraseology. The trouble seems to be with the definition of property as future goods. This is true "in a way," but the relations are not so simple; "future income" does not necessarily mean "anticipated consumption." The question will receive further notice presently.

The failure to take uniformity of distribution as a basis of reckoning seems to underlie the peculiar outcome of Böhm-Bawerk's tables (Positive Theory, Bk. V, ch. 4) of which Professor Fisher has made so much (Rate of Interest, ch. 4). It is neither true nor false, but simply unmeaning, to say, as Böhm-Bawerk so often does, that "present goods are as a rule worth more than future goods of like kind and number." One is reminded of the tramp, who finding a hundred-dollar bill, made a bee-line to the nearest quick lunch and excitedly ordered a hundred dollars' worth of ham and eggs! There is no question of the relative value of seven dinners according to which day of the week all are to be eaten. Professor Fisher rightly recognises that the time-shape of the income-stream is the significant matter.

of production over consumption in the individual lives as units.¹ It is for the individual a question of discounting not merely present to future, but his own consumption to that of others. A progressive society may be said to discount the present, perhaps, tho the significance of the assertion is doubtful. The motives of net accumulation and those of postponement of consumption are categorically different, tho both modes of conduct would be likely to result from the dominance of the same temperament.

Here again the neglected field seems more significant than the one to which attention is usually given (or in with which it is indiscriminately thrown) and it may be of interest to note a few points in regard to the motives which look beyond the individual life. (We must assume a "productivity" distribution of income and suppose that each individual is free at all times to dispose of his whole product as he wills.) In a sense, any concern with the world that will be when we no longer exist may be called irrational, but it is real, and one of the most potent forces in shaping human conduct and the character of civilization.

We may distinguish three sorts of conscious motives looking beyond our own lives. (a) An interest in our post-mortem reputation or prestige. By this urge we are led to build Great Pyramids (and less imposing resting-places for our remains); to found universities bearing our names; to build (with the vainly-protesting stockholder's money) magnificent railway stations not demanded by traffic conditions but forming splendid monuments to our administration; hotels and business blocks in our home town; and the like. (b) A personal affection for and interest in survivors, children and

¹ In a society where capital is productive, the postponement of consumption by individuals within their own lives would, however, result in their being in existence at any moment a slightly larger amount of productive resources.

other relatives, or friends. (c) Ideal interests of the most varied sort. A large part of the human race have impersonal solicitudes for things whose prosperity depends on the accumulation of wealth. These range all the way from an exalted concern for human progress down through sentimental attachments to places, institutions and the like, especially the business itself which one's life has gone to establish and build up. Both (b) and (c), it is apparent, commonly contain various admixtures of (a).

To these must be added wholly irrational grounds, hardly conscious motives at all, but probably as potent on the whole in promoting the abundance of capital as are any others. Such are the gaming spirit, social suggestion and the mere force of habit, running in the extreme case of the miser into complete obsession. Business, like other human activities, is largely a matter of emulation, imitation and rivalry. Men produce and accumulate because "others are doing it" and because it affords a measure of personal prowess and success.

(2) The question of the production of value specifically for capital uses, that never would have been produced for consumption, naturally includes most of the net saving beyond the life of the individual already discussed. Little more can be done here than to point out the existence of the general problem, and the extreme simplicity of assuming, as much discussion of the interest rate seems implicitly to do, that the amount of production and hence of consumption is fixed, and that the only alternative of choice relates to the time of consumption. Under theoretical conditions each individual produces goods up to the point of equivalence between the reward and the sacrifice connected with the last unit. Hence in any case, every increment of saving would increase the marginal utility of present

consumption (by cutting off some of it), which would always lead to the productive operation being carried farther than it would have been for the purpose of present consumption alone. Even if goods were really produced for their immediate utility and only subsequently "saved," as a sort of afterthought, the fact of saving would lead to increased total production.

Now consider that our largest producers, from whom we get a great part of the social saving (both out of their own incomes and out of other people's, through the compulsory investment of revenue in corporation property) never have in mind in connection with most of their productive activity any consumption of commodities at any time, much less in the present, but are actuated by quite other motives. The possession of wealth confers social position and gives one power over the lives and destinies of his fellows "even to the third and the fourth generation." Moreover, the very act of producing, when carried on in the competitive spirit, gives a pleasure to which sacrifices comparable to those of a prize-fighter in training are often gladly made. It is the most exhilarating game ever contrived by the combined genius of the human race and the blind forces of history. When we reflect that men are lazy and love ease far more than luxury, it is clear that an enormous portion of the total wealth production of any modern nation, and probably the larger part of that which is said to be "saved," would never have been dreamed of in connection with mere consumption uses. Even with reference to those savers who may be supposed actually to balance saving against present consumption, it is probable that, on the whole, provision for future contingencies, rather than the interest on savings, constitutes the dominant motive in their minds. Possibly the fact of interest is as likely to induce them to save

✓ less as more.¹ It is a strained and highly sophisticated logic indeed which attempts to analyze the motives of capital production in terms of relative estimation of "present and future goods."

As a result of this part of our discussion, we may attempt to draw a supply curve for capital, of some degree of verisimilitude. The important point is that while the postponement of present to future consumption is at best a relatively inconsiderable source of capital, and is probably influenced very little by the rate of yield (possibly even adversely) the more important social and moral motives for the creation of capital are bound up with its return, and are, no doubt, in some rough way proportional to the rate of the latter. For these motives can be summed up in the two phrases "personal prestige" and "social power"; and the amount of both conferred by the possession of capital is obviously a direct function of its productivity. On the whole, then, we find justification for representing the conditions of the supply of capital in the conventional way, by a curve ascending as the rate increases. (See Figure 1, page 300, curve OA.) The details of the curve are of course arbitrary, the exact coincidence of the zero points of interest and accumulation being especially improbable, but the general shape probably corresponds with the facts. Even tho the securing of the interest is not the dominant motive of accumulation, the two may vary concomitantly from other causes.

Care must be taken, as we shall see, to interpret this curve correctly. It relates exclusively to a given moment of time, and shows simply what the *rate* of saving would be if the rate of interest were such-and-such. It is a purely hypothetical representation of a momentary

¹ A point made by different writers, notably by Professor J. B. Clark, in his *Essentials of Economic Theory*.

situation; any capital production which takes place under the conditions must change the conditions of subsequent saving and investment, as will be shown at length in Part IV.

III. THE DEMAND FOR CAPITAL

Why do men borrow other men's titles to general wealth? The first part of the answer has been given in Part I. The reason the business man prefers to borrow "money" rather than to rent specific property is simply that it is cheaper. It is cheaper because this form of loan saves the lender the payment for the entrepreneur activity of "committing" the value to the form desired, which he is willing to perform on a narrower margin himself. But what the borrower always wants is the use of some specific form of property. The motives for desiring property need not detain us long. We know that some are spendthrifts anticipating future legacies and want to live on a grander scale than present resources allow; that others are sick or out of work or temporarily "hard up" from some other cause, and so in a different sense have the same desire; but that, completely overshadowing all such cases, in the actual loan market of any civilized society, many forms of property are aids to the production of wealth and hence desirable because sources of income to their possessors. In the typical loan at interest, the only one which we need consider, it is some kind or combination of kinds of *productive property* whose use is wanted.

The productivity of property is familiar enough in economic literature, but as there is anything but unanimity in regard to its precise meaning, a few words as to the interpretation on which the present argument is

based seem called for. This view is what is known as the "specific productivity theory," with some qualifications. It says that under an impossible system of ideally perfect competition each productive agent will get exactly that portion of the social dividend which is dependent upon its use in production. Under actual conditions, where competition is not perfect, this will be reduced to the value set upon its *anticipated* product by the entrepreneurs competing for its use, the difference between this amount and the realized product constituting the entrepreneur's profit. What is dependent upon the use of any agent is the amount that will *necessarily* be deducted from the total product of the society if it is withheld from use. That is, an agent secures nothing on the ground of the importance of the position it happens to occupy in the industrial organization. For if an agent in an important place were withheld it would immediately be replaced by the one in the least important place, that could be substituted for it.

The principal "qualification" is that we must speak of actual productive agents — one man, one machine, one mine, one plot of ground of the size which actually figures as a unit in business calculations — not of "productive factors." The process of funding rent-bearers or wage-bearers into homogeneous masses is arbitrary and illegitimate. The only true funds are composed of actually interchangeable agents, units of which really compete perfectly with each other. Now the constitution of such groups would be different for every different use and very largely a matter of degree in any case; also they would cut across labor and property lines in the most bewildering fashion, for the relations of interchangeability are hopelessly complex. Any general funding, as into capital and labor, or land,

capital and labor, is based on value productivity itself, a clear case of reasoning in a circle.

✓ Some other misinterpretations must be guarded against. Economic productivity has no connection with either moral desert or physical causation. No agent can be more productive than any other which can be substituted for it. Hence a no-rent agent, even when used, is unproductive, for it can be replaced by one not worth using. Professor Adriance,¹ for example, has confused economic productivity with physical use, in a manner quite parallel to confounding utility with economic value. Productivity, like value, is a function of limitation of supply. Professor Böhm-Bawerk, again, failed to see that his own "superior effectiveness of longer processes of production" is equivalent to what is meant, in the minds of productivity theorists, by the specific productivity of the property on which those longer processes are based. Hence Professors Fisher and Fetter are right in accusing him of adopting the productivity theory of interest after refuting it, tho when we turn from the incident of terminology to the real issue involved, he is more right than they. Böhm-Bawerk, however, does not go far enough; the ✓ productivity of capital is not merely the indispensable condition of interest, it is the rate of interest, as we shall see.

Our problem is now reduced to showing what is meant by the productivity of capital as we have defined it, or of money loans. The productivity of rent-bearing property we may now assume as admitted, but the essence of our definition of capital is that it is *not* material property. The clue to the difficulty is in the phenomenon already frequently referred to, of the "fixing" of wealth in specific forms. A claim on wealth in general

¹ In the article on "Specific Productivity," in this Journal for November, 1914.

can be *converted into* the ownership of definite pieces of property. If surplus wealth or value can be transformed into something which adds a definite amount per annum to the total product of society, it must be clear that competition will impute to the capital that increase in amount as its own "product." We have now to examine the nature of this process of conversion.

Here will be seen an added advantage of a correct definition of capital. Not merely does the definition adopted, that capital is simply exchange power offered for lending, correspond to the facts of business usage, but it is essential to a theoretical solution of the interest problem. It enables us to side-step at once the whole controversy over the valuation of capital goods, for capital goods or productive pieces of property bear rent and not interest.

It will help to make clear both the meaning and the significance of the convertibility of capital and rent-bearers if we glance for a moment at a hypothetical society in which the phenomenon would not exist. A simple supposition will realize this condition. Productive wealth might not be produced at all, but might simply exist as a given quantity, entirely beyond any degree of human control, either as to its amount or quality. A primitive people with no knowledge of means of extending its productive resources may be thought of as living under a régime of private property and free exchange. Under such conditions, not only would land be rented for approximately the annual value of its products, but mere supply and demand in the market might establish a fixed rate of exchange between consumption wealth and the income-producing property.¹ Landowners without heirs might sell off

¹ A psychological interest theory similar to that of Professors Böhm-Bawerk, Fetter, and Fisher can be made to fit this situation.

their holdings to men of family ambitions and large productive powers, or possibly some exchange would take place between mere spendthrifts and mere misers. Moreover, the phenomenon of true interest might exist in such a society to a very limited extent; if the income-bearing agents were subject to large and unpredictable fluctuations in value, there would doubtless be a tendency toward separation of the speculative from the investment element.

Next let us modify the hypothesis by supposing that productive agents can be added to by forces under human control and human efforts themselves, but *by completely specialized agencies only*; that the population itself is divided into two parts so that laborers who make productive agents are completely separated from those who make consumption goods, except for free exchange between them. A real, tho indirect and very limited convertibility will now exist. An increase in income-bearers will result from an increase in consumption goods offered in exchange for them, through the calling into use of agents or activities of agents which were previously sub-marginal; especially by bringing no-rent natural agents into use and paying laborers to work longer or harder. Such a process could not go far without greatly affecting the ratio of conversion and probably putting a stop to the exchange.

If the requisite motives were present (in the form, presumably, of a sufficient power in exchange over income-bearers) to induce the conversion, and if a sufficient amount of uncertainty were present to bring about the separation of the conversion from the production of the surpluses of consumption value, capital loans at interest would be common in the society just described. It scarcely need be pointed out that the "ideal rate," would be simply the percentage which

the income of the rent-bearers purchaseable with a given amount of value makes of the value itself. The "actual" rate would be reduced by the competitively established remuneration for the entrepreneur service of making the exchange and taking the "chance" (in one sense of that highly ambiguous word) on the future income (and value) of the rent-bearers purchased.

In actual society a much more complex set of conditions leads to substantially the same result. Rent-bearers are producible in part by the same labor and material agents used in making consumption goods, in part by different agencies. We now have a direct and practically unlimited effective convertibility of utility-bearers and income-bearers. An excess of the latter offered in exchange for the former can now *divert* those productive services common to the two uses¹ from the production of the one to that of the other. Of course at the same time it shifts the use margins of different kinds of material agents, and moves the margin of equality of reward and sacrifice in the case of labor, up and down accordingly. The ratio of convertibility under these conditions will be that of the *specific product* of the shifted productive services in one use to their *specific product* in the other. That is, a surplus of "value" offered in the market will buy in rent-bearers the specific product, when used to create rent-bearers, of the productive services (mainly labor) whose specific product the value so offered is.² And under ideal conditions the product of the rent-bearers so purchased will immediately be imputed back to the "capital" which led to their creation, as its own proper product. Under

¹ As these services are especially labor, we see the fundamental soundness of the classical view (followed by Professor Taussig) of treating capital as advances to laborers. The natural agents used in producing capital goods are mainly mines, quarries, and timber land, all virtually specialised.

² Whence it appears that in a second way the specific productivity theory of distribution is absolutely essential to a tenable theory of interest.

actual conditions its imputed product will be reduced by a small margin of entrepreneur's profit, as already emphasized.

This entrepreneur's profit cannot in fact be said to be "imputed" to the entrepreneur, or to be his "specific product" in quite the same sense that the contractual income is imputed as product to the agent which gets it. A similar "margin" will also separate the sum of the rents (including wages) imputed to the concrete agents in any successful establishment from the total income, or product, of the establishment as a unit. But these differentials are "in a way" the product of the entrepreneur, and we may for present purposes treat them as such, and say that the capital gets its own specific product, entire. With this small reservation, which to discuss here would carry us quite too far afield, we may treat as established the following proposition: *The rate of interest on any capital loan is the anticipated specific productivity ratio of the capital in question, when converted into rent-bearers by the diversion of productive services from other uses.*¹ The last part of the statement is explanatory and unessential.²

¹ I cannot omit all reference to the ingenious logic by which Professor Irving Fisher maintains that the productive loan is for the purpose of anticipating an increase in income and equalizing consumption. (See *The Rate of Interest*, ch. 13, §§ 3-6.) The alleged intermediate option is in fact rarely present to the mind of the borrower, and is generally non-existent. The typical business loan secures an addition to the resources of the borrower, indispensable to the carrying out of the project for which it is to be used. Let the reader picture if he can, the aspiring young business man serenely "informing" some king of finance that he is about to make an investment of a hundred thousand and would like to borrow the amount so as not to disturb the shape of his income stream!

Professor Fisher admits (p. 250) that the investment is made "because the rate of return . . . is greater than the rate of interest," which if followed out will lead to the view here maintained, the separation of the "product" of agents made with borrowed capital into the "product" of that capital and the "profit" on the conversion. His treatment of the high interest rate in new countries (ch. 13, § 10) similarly fails to give product where product is due. The capital loan is manifestly indispensable to and actually secured for the purpose of creating the increase in income which he treats it as merely "anticipating."

² On page 295 it was stated that the method of analysis here employed "side-steps" the controversy over the valuation of productive agents. But it will be evident

IV. THE EQUILIBRIUM OF SUPPLY AND DEMAND IN RELATION TO THE CAPITAL MARKET

The proposition or "law" just laid down may seem to have the air of a final solution of the interest problem, leaving nothing more to be said. Its limitation as it stands is that it relates exclusively to a very short period of time. *If*, at any time, the inducements (including the rate of interest itself) are sufficient to attract surplus production of value, wealth or "money" to the loan market, it will be loaned at a rate equal to the product of the agents into which it can be converted (divided by the amount of value loaned). What remains to do is, in brief, to inquire what will happen next, to examine the probable trend of the interest rate in advancing time, other things being assumed constant. This part of the argument can best be presented in connection with a criticism of the application to the interest problem of the principle of the equilibrium of supply and demand used in explaining the value of commodities in general.

The first step will be to glance at this conventional diagram of equilibrium and to insist upon an obvious but neglected feature of its interpretation. The quanti-

to the thoughtful reader that it at the same time affords a complete solution of that problem. The exchange ratio can be none other (while conversion is possible) than the physical ratio of convertibility in the sense explained.

The cost of capital goods is another question similarly unnecessary to discuss under this method of attack. I may say dogmatically that the whole question of costs seems to me irrelevant in static analysis. In the static state, cost and value are merely different aspects of the same thing. Cost has meaning only in connection with changes in the productive organisation. Under conditions where uncertainty is present, there may be said to be a real problem of costs, but it is merely the problem of profits. The problem of the distribution of costs is also real, of course, but it again is merely the problem of imputation.

The valuation of "non-reproducible capital goods" may also be dismissed by pointing out that they also go back to some human activity of preëmption and development, and are not theoretically different from shorter-lived agents except in degree. Land value probably represents an investment of quite as much human pain as any other equally considerable category of value in the world.

ties represented by the abscissas of both curves are *rates* of supply and demand respectively, quantities which will be offered and taken in a unit of time at the prices indicated by the corresponding ordinates. Under ideal conditions a negligible amount of the commodity is in existence at any moment; that it is consumed as fast as produced is the fundamental assumption of equality of demand and supply (*rates* of demand and of

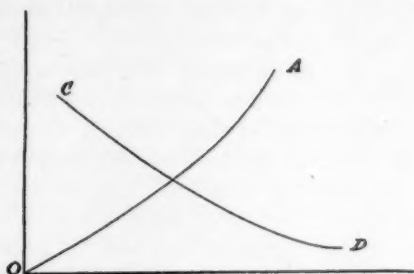


Figure 1.

supply) underlying the analysis.¹ The situation is entirely different from that of a market where a fixed stock of goods must be sold, depicted by a diagram similar in appearance but in which the abscissas represent definite *quantities* of commodity.

It is not difficult to show the error in applying this analysis to the loan of capital, which is not continuously consumed in satisfying a constantly recurring want but added to an ever-growing stock, and each unit of which

¹ This was pointed out by Jevons, *Theory of Political Economy*, 3d ed. (also 4th), p. 64. Cited by Professor A. A. Young in this Journal, vol. xxv, p. 423. It has recently been insisted on by Hobson in *The Industrial Process* and *The Science of Wealth*.

forever destroys the opportunity of using another unit in the same way. Perhaps the difficulty may most readily be brought out by referring to a recent standard exposition of the "eclectic" theory of interest, that of Professor Taussig's *Principles of Economics*. Referring to the diagram (reproduced herewith, see Figure 2) he says:¹

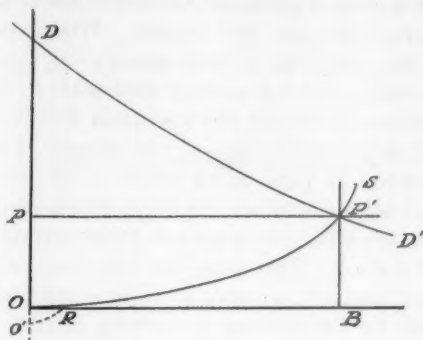


Figure 2.

The conditions of demand are indicated by the line DD, whose descending slope represents the diminishing productiveness of the several *installments* of capital. The ascending line ORS indicates the conditions of supply, — the increasing prices which must be paid in order to induce the several *installments* of savings which enable the capital to be forthcoming. . . . The rate of interest settles at a point where the marginal productivity [productivity of the marginal installment] suffices to bring out the marginal installment of saving." (Italics mine.)

It requires no elaborate demonstration that the "installments" represented on these two curves are two entirely different sorts of things. That of capital is a

¹ Vol. II, p. 23.

definite amount, that of saving a given rate of continuous accumulation; for however we formulate the motives or conditions of saving, the reaction to those conditions at any time (in a progressive society) is not a fixed amount of capital but a given rate of increase in the amount. Economists are confused by the practice of jumping in their value analysis from the discussion of the sale of a stock of goods in a market to the conditions of continuous demand and supply. Where the new factor of time comes in on both sides in the same way, no error results, and it is perhaps legitimate to simplify the exposition by making the transition without explanation. But the application to the interest problem is illicit because the time factor comes in in one of the curves and not in the other, one representing increments of a stock, the other increments of an increasing rate of supply of a stock. The ascending (supply) curve is, as already pointed out, a curve of *varying rates* at which capital will be forthcoming at varying market inducements in the form of interest. But the demand curve represents the return per unit which will be yielded by *successive amounts* of a total supply of capital. The one is applicable only to a given set of conditions, at a given moment, the other describes a given set of conditions and shows what will happen independently of time. The demand curve may be thought of as depicting the productivity per unit of an increasing stock of capital, but more simply from the present point of view, as merely the productivity rates possible in all the different investments open to the society in the beginning. As investment goes on, the better of these opportunities are used up in order, and at any moment the productivity of new investments is simply what it is, the rate of return in the best remaining opportunities.

Such curves have no relation whatever to each other, and their intersection means nothing at all. Two separate problems here call for analysis, the conditions obtaining at a particular moment, and the historic course of events or the trend of the interest rate in time, under static conditions.

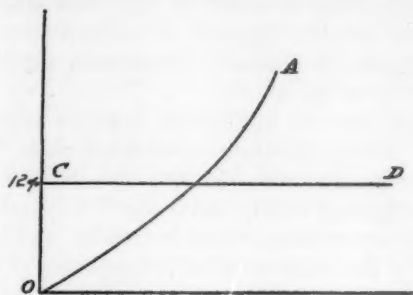


Figure 8.

The first problem is very simply dealt with by a diagram, illustrating the verbal analysis given above (Part III). In the accompanying sketch (Figure 3), OA is the supply curve, showing, under the conditions obtaining at the time, the amount of capital per unit of time (say dollars per week) which will be, or rather would be, offered at different rates of interest.¹ The conditions of demand at the moment being simply the anticipated productivity of the next unit of investment, are to be represented by a horizontal line at the proper point. This might be 12 per cent, if the society were young and

¹ The reader who is still unconvinced after the discussion in Part II, may regard this as a psychological, or even as a time-preference curve, if he so insists, without affecting the present argument in any way.

its environment favorable. The interest rate will then be fixed at this point, and the society will bring forward at the corresponding rate, whatever it may be, new capital for investment. We must suppose that new capital would be brought forward quite rapidly, but no rate of accumulation could affect the rate of return until an appreciable period of time had elapsed, an appreciable absolute amount of accumulation made, and an appreciable number of investment opportunities eliminated from the market.

There is here no equilibrium between supply and demand. An equilibrating action takes place, but it is of a different character. Instead of a variable rate of interest adjusting supply and demand to equality, it is the rate of accumulation which is variable, and it adjusts to equality the relative subjective estimate of the two classes of goods, (consumption goods and productive agents) on the one hand, and their physical ratio of conversion on the other. The rate of interest is fixed by technical productivity and the social reaction is a rate of accumulation which leaves its marginal estimates of utility-bearers and income-bearers in the same ratio as their physical conversion ratio.

Let us now consider what will happen in the next short interval of time. The capital saved and invested in the preceding interval will have changed the situation in *two* important respects. Not merely will a certain grade of investment opportunities have been used up — annihilated as far as present market conditions are concerned — but the income of the society will be increased by the return from these intervening investments.¹ The new situation may be represented (along with the old, shown in dotted lines) by the diagram of Figure 4. We

¹ Supposing that the elasticity of demand for capital is greater than unity, a perfectly safe assumption in view of the facts; it must be enormously high. In fact, the difficulty is with the exchange value concept and not with our reasoning in any case.

take an interval sufficiently long to show appreciable change — perhaps twenty years in such a society as referred to. The supply curve will now be reduced in slope, since the income of the society is greater than before, and it is easier to supply a given amount of surplus (whether out of production at large or by way of special production); we may, therefore, suppose that

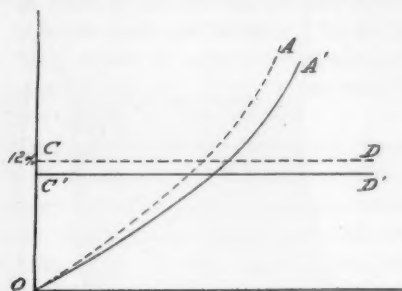


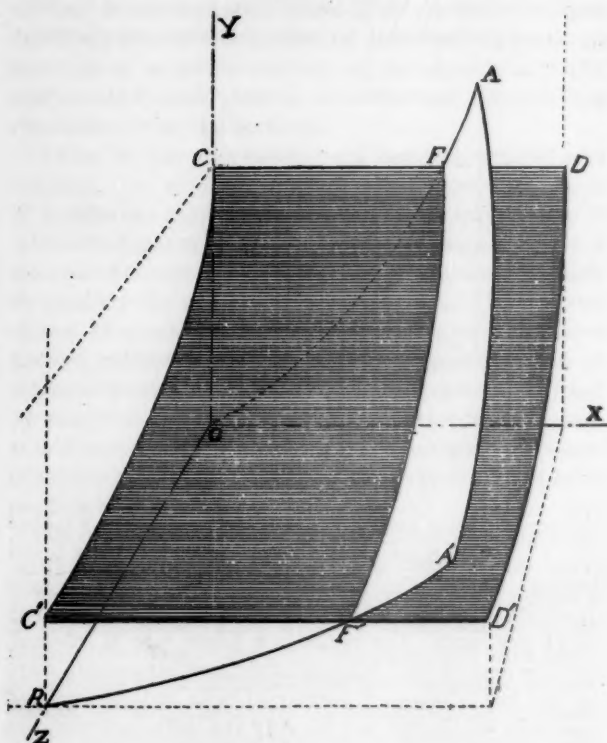
Figure 4.

the same level of return will call forth supply at a higher rate.¹ At the same time, the productivity being lower because not so good investment opportunities remain open, its line must be drawn below the former one, say at 11 per cent. The result is a lower rate of interest, but the rate of saving being influenced in opposite ways by the two changes (lowering of both inducement and sacrifice) its change will be only the difference between the two effects. We may suppose it about the same as before.

¹ The connection between rate of return and actual inducement to accumulation is so delicate and uncertain that this assumption is somewhat open to question, but it seems probable on the whole.

To represent the trend of the interest rate through a long period of time, three dimensions are required. A row of diagrams similar to those just discussed are

Figure 5.



strung out along a time-axis perpendicular to the plane of the paper, with the result shown in Figure 5. As the plane of the diagram of Figure 3 is moved along the time-axis OZ, the horizontal (productivity or rate

of interest) line constantly descends, but at a decreasing velocity, generating the inclined, curved surface CDC'D'. The capital supply curve OA flattens down as it moves forward, generating the spirally warped surface OARA'. Any cross-section of the two surfaces perpendicular to OZ represents the condition at the corresponding moment of time, and has the form of Figure 3. The line of intersection of the two surfaces, FF' is a historic curve for both sets of data. Its Z-values show the time, its X-values the rate of accumulation (approximately constant) and its Y-values the rate of interest (constantly falling).

A word must be said as to the static assumption in regard to other conditions. Confusion with Professor Clark's conception of the static state is particularly to be avoided. Any accumulation of capital would itself be a violation of his postulates. But are such postulates permissible? Can we assume, consistently with natural possibility, a total set of conditions to be static when if part of them are so others cannot be? Apparently the only things we have a right to *assume* as constant are the natural environment of the society and the essential characteristics of the population itself. In particular, its *tastes* (in the most inclusive sense) must not change, and its *knowledge* must not grow. Changes necessarily resulting from the reaction of a static population to a static environment cannot be eliminated by legitimate hypothesis, and it seems clear that a progressive accumulation of capital and fall in the interest rate must be conceded to come in this class.

Will this process go on forever, or where will it stop? The answers to these questions would depend on the assumptions, but we may speculate on the case of an actual society — say the United States, if environment

and population were to be held constant as they now are. On the demand side, the opportunity for investment of new capital at very low rates of interest without any addition to present knowledge of means of production or modes of consumption or change in the tastes of the people, seems practically unlimited.¹ On the supply side, conjecture is more hazardous. We know that much accumulation would take place even at an expense to the savers. As to the conditions under which accumulation once made is "eaten up" by the failure to maintain productive property, almost nothing is known. Moreover, the principal inducements to accumulation, the non-economic sociological motives, would inevitably change as the process went on. Perhaps it is also illegitimate to assume the human factor in the situation as constant, when the derived factor of social conditions undergoes such profound modifications. Possibly as reasonable a guess as any would be that if conditions suddenly became "as static as possible," the interest rate would fall for a long time in the future — due largely to the force of the saving habit — and finally be brought to a stationary condition by inevitable social changes.

In actual history, it is superfluous to remark, the interest rate has been held up by improvements in the arts, together with the growth of population and of individual wants — all resulting in new opportunities for the investment of capital or its conversion into productive agents. This phase of the subject can also

¹ A different view has been expressed by Professor Taussig, who also shows agreement with much of the position here maintained. (See this Journal, vol. xii, p. 357.) After asserting that "the 'static state' . . . means a condition in which the arts are stationary" (the present view exactly) he goes on to say that "an increase of capital, in such a state, means an addition of tools and materials of the same kind that were used before." It seems to me that we must say rather "of kinds that were known before to be available." For indications of the general line of argument here developed see the same article, p. 355, and his *Principles of Economics*, vol. II, p. 27; also Marshall's *Principles*, p. 534 (6th ed.).

✓ be represented on the three-dimension diagram by a slight modification. The productivity surface OARA' (Figure 5), instead of sloping downward in time, requires but to be raised to a level, or even above, or given whatever undulations are necessary to express actual conditions at the different points of time.

When the process did finally come to a term, if it ever did, and a stable or "static" rate of interest came to prevail, conditions of equilibrium would be present; a diagram similar to the conventional one could then be made to fit the situation, tho the interpretation would be somewhat different. But in a progressive society, such as economic science is now interested in, the equilibrium is of a wholly different character, the rate of accumulation and not the rate of interest being the equilibrating variable. As far as the interest rate is concerned, the conditions of demand completely ✓ dominate the situation at all times and the conditions of supply make themselves felt only through changes in the conditions of demand resulting from the actual workings of new supply.¹

If a time ever came when sufficiently favorable opportunities of investment did not exist (or the sociological motives were too weak) to bring forth an excess of value production over consumption, then the supply curve would not intersect the productivity line (in its positive portion) and the principles discussed above would be inapplicable. If the point of zero accumulation were actually above the productivity level, there might be a tendency to the reverse "conversion" by failure to maintain capital goods. Hence it may be correct, in a sense, to say with the "eclectics" that interest "tends

¹ The situation is similar in essential respects to that of the valuation of gold, or rather what the latter would be like if gold were the only money and were itself used exclusively as money. Gold, like capital, is not consumed, but accumulated. See Tausig, *Principles*, Chapter 19, for a clear exposition of this case.

toward " such an " equilibrium level." But we can surely give the phrase " normal interest " a more significant interpretation than this far-off and wholly hypothetical situation affords. The normal rate of interest at any time with which we are concerned has been, is, and will be, the anticipated productivity of the next unit of capital investment at the time under consideration.¹

F. H. KNIGHT.

CORNELL UNIVERSITY.

¹ A similar " equilibrium level " may be imagined in the case of gold, when its value would just call forth new supply sufficient to replace abrasion and loss. And this " equilibrium level " would be as significant for the problem of the value of money as that for capital is for any problem in which living men are interested, that is, hardly at all.

RELATION OF SCIENTIFIC MANAGEMENT TO LABOR

SUMMARY

I. Introductory. Definition of terms, 311. — Distinguishing features of scientific management, 312. — Scientific management is positive management, 314. — II. The influence on basic wages, 315. — Wages and the labor problem, 317. — III. The bonus method and its results, 319. — Effect of increased production on employment, 322. — Skill and initiative, 325. — Health, 327. — The "first-class," the average, and the sub-normal; legislation on the minimum wage; employment of women and children, 327. — IV. Labor unions; incompatible policies, 330. — Possible bases of co-existence, 339. — V. Larger social problems. Unemployment, 342. — Education and skill, 343. — Inequality of income, 345. — Democracy in industry, 346. — Prospects for the future, 348.

I

INTRODUCTORY

THE discussion of the relation of any new economic factor to existing economic and social tendencies requires clear definition of the factor under examination. The system of management currently known as "scientific management" or "the Taylor system" has been variously referred to as a new form of industrial organization, a new type of administration, a new "system." Again it is said to be a science, an art, a set of laws, principles, rules, methods and processes, a policy, or even a set of forms and mechanisms. Its significance as an economic factor depends upon which of these things it is.

Let us clarify our terms. Industrial organization is the definition, correlation and coördination of parts and functions in a group of elements made up of land and buildings, capital and credit, equipment and men,

adapted to attain the ends of economical manufacture, sale at a profit, and growth at least to the point where the effect of diminishing returns counterbalances the possible advantages of further expansion. System is the mechanism whereby organization performs its functions of administration. Administration is the dynamics of organization. It is the injection of initiative, stimulus, and control into the static system of which organization is a cross-section. Rules, methods, and processes are names of varying degrees of inclusiveness for the prescribed procedures in the accomplishment of usually circumscribed and isolated results. A policy is a generalized rule determined by a process of trial and error rather than by a scientific method of investigation, and justified empirically by its results.

Under these definitions it is apparent that scientific management is a type of industrial organization and administration with a system of its own and involving the use of rules, methods and processes and to some extent, of policies, just the same as any other type of management. What is to differentiate it from others?

Scientific management in its best manifestations may be distinguished from other types of management in that it proceeds on industrial principles which may be defined as generalized rules of conduct based on *law*, recognized or as yet undiscovered, and useful for the attainment of important industrial ends such as maximum output, low cost, high wages, equitable distribution, reduction of unemployment, industrial peace. If we define a law as a summary statement of fact or a description of a tendency common to a class of things, then an industrial law is any law, physical, chemical, biological, psychological, economic, or social, which is or may be a factor in industrial management. The test by which scientific management makes any law an indus-

trial law is the effect of that law on economy of production or conservation of energy, human or material.

What makes a type of management scientific, then, is the fact that it rests on laws and principles rather than on policies. To be sure, until all the laws and principles of management are ascertained, it still remains true that policy must play a large part and that to that extent management remains at least partially an art; but the intention and the conscious effort to reduce the field of policy and enlarge that of principle and law justly entitle any system which holds to it consistently to the name scientific management.

That the Taylor system is such a system has been shown in former articles.¹ It rests on both laws and principles. Its laws are the physical and chemical laws covering materials, equipment, and processes; and the psychophysical laws, undoubtedly operative no matter how dimly understood, which govern the individual conduct and reactions of the human beings involved. Its principles are those which govern the relations of individuals to each other in organized groups and the methods of procedure by which scientific management is made effective in practice. It is important to bear in mind the distinction between the science on the one hand and the principles on the other. Natural laws are fixed and inflexible. They cannot be altered by a majority of votes. Principles, however, if defined as rules of conduct, may be changed and in fact are constantly subject to modification.

The most distinctive contribution of scientific management has been in the field of principles rather than in that of laws. The determination of laws is a long and usually unlucrative process, better carried on by "pure

¹ See my articles, "The Literature of Scientific Management," in this Journal, August, 1914; "Scientific Management in Practice," *ibid.*, February, 1915.

scientists" in their laboratories for the benefit of all possible users than by individual managers distracted by a multitude of practical problems and interested only in their personal advantage. Mr. Taylor's work on *The Art of Cutting Metals*, which at times converted whole sections of shops into laboratories, is the conspicuous exception which proves the rule. On the other hand the successful administration of a new type of organization absolutely requires the determination of the principles on which it will be conducted. Starting therefore with the principle of basing all productive activity on law, Mr. Taylor was compelled to work out the principles which have now become known distinctively as those of scientific management. The science of industrial conservation is a free field open to every one capable of cultivating it, but the principles of industrial organization as developed by Mr. Taylor are thus far the distinguishing possession of those trained by him or his immediate disciples.

This analysis makes clear the fact that scientific management is the extension to industrial organization of the positivist movements in current thought. The substitution of a basis of scientific law and principles for guess work or tradition reminds one strongly of Comte's theory of progress from the "theological" through the "metaphysical" to the "positive" or scientific stage of thought. It is interesting to observe that scientific management is positive management in other senses as well, which flow from its essentially scientific aim and method. Its administration is marked by the positiveness of its control. So far as possible, nothing is left to accident or to individual judgment. The time, place and sequence of all operations as well as the details of all processes are determined and enforced by the management. The result of the application of the science

of industrial conservation and the principles of industrial organization is to develop the inherent resources and capabilities of an organization far beyond the average or normal degree of efficiency. This distinguishes scientific management from the current types of "efficiency systems" which are usually based on varieties of cost keeping built on the methods of accountants rather than of statisticians, superficial observations and incoördinated improvements. Their aim is to "stop leaks," "eliminate wastes," "avoid delays." In other words, to remove a mathematical negative and bring an organization to a normal standard. The aim of scientific or positive management is to carry an organization beyond this normal standard and bring it to the utmost degree of efficiency of which it is capable. In other words to accomplish a mathematically positive result.

The most interesting questions connected with the effect of scientific management on the labor problem are first, its influence on basic wages: second, the probable consequences and effect of the method of differential payment by means of the bonus; and third, the relation of scientific management to fundamental labor union policies and practices. These will be taken up in order.

II

THE INFLUENCE ON BASIC WAGES

Scientific management tends to shift the demand from labor which is already skilled to that which is teachable. It draws its labor supply not so much from those equipped with the usual store of traditional knowledge and technique as from those with the aptitude which enables them to respond quickly and effectively to the intensive training in the newer methods.

The effect of this tendency would be eventually to abolish the line between "craft" groups. Factory labor may today be arranged in a hierarchy of day laborers, "lumpers," automatic machine tenders, helpers, skilled machinists and artisans, foremen and clerks. Scientific management as actually practised trains each of these grades in a variety of functions usually performed by other grades. Thus laborers may easily become truckmen. Truckmen may at a pinch attend the simpler automatic machines. Machine tenders are easily made into helpers, and helpers into skilled artisans. The class of foremen and of clerks is almost invariably recruited in scientific management plants from the better men in the lower grades of labor.

The characteristic functionalization in the executive positions opens these positions to types and grades of ability to which they have heretofore been closed. Specialization puts these positions within the range of men who are competent in executive functions such as "getting work through," inspection, or breaking in new operatives, and has made obsolete the type of all-round ability (much written about but rarely found) which was erroneously supposed to be a requisite of the old methods. More lines of promotion are thus opened and the demarcation between the workmen and executive groups tends still further to be obliterated.

In short, the effect of these features of scientific management is to break down the traditional lines between craft groups while at the same time they develop individual differences and individual abilities to the utmost and thus establish a new grouping on the basis of inherent and acquired capacity.

Some economists would say that the abolition of craft groups would not only tend to level wages by increasing the homogeneity of labor, but to lower them on the

whole by extending the marginal zone which they say is the controlling factor until it includes a lower grade of efficiency and productivity. Such perhaps would be its effect in practice were the tendency not offset by certain countertendencies.

The first of these is the greater productivity of labor in the new grouping due to the positive methods of scientific management. This makes all grades of labor more desirable for the entrepreneur. Or if you prefer to put it that way, it raises the value of the marginal workmen.

The tendency to increase the number of entrepreneurs is an aid in the maintenance of higher wages by intensifying the competition between them for labor.

The thoroughgoing development of differential abilities in individuals within groups clearly brings out inherent differences in effectiveness and value which are more or less obscured by current methods of measuring the worth of workmen. Considered as "capital" on the analogy of instruments (made by man) and land, the "rents" for their differential abilities are more clearly brought out, and the capitalized value of each workman is more easily ascertained. As the more keenly competitive utilization of land has on the whole tended to raise the total amount paid to owners as rent, so it would seem fair to assume that the keener competition for workmen and the clearer differentiation in their worth should tend to increase the total amount paid to them as wages.

The same differences in inherent capacity which tend on the whole to raise the total of wages also tend to maintain the higher wages paid to the more able individuals, inasmuch as the differences which under scientific management conditions are important are natural, inherent and practically ineradicable.

If these propositions are true we can proceed to the familiar chain of reasoning to the effect that increased wages tend to raise the standard of living and with it to decrease the size of families. This in its turn decreases the supply of labor, which, assuming that its product remains the same or even increases, raises its value. In this way also exceptional opportunities are afforded to children for still further development of inborn abilities and accentuation of differences. The net effect of all these is the maintenance and progressive raising of wages and the standard of living, with their mutual and cumulative reactions.

Today it is probably true that the relative disagreeableness of different kinds of work has little if anything to do with the rates of wages. Those rates seem to be determined by a number of forces, among which customary standards, such differences of ability as may become apparent under current methods, and the relative bargaining powers of employees and employers are the controlling factors. The abolition of artificial "non-competing groups" and re-alignment on the basis of lines of individual ability tend to accentuate differences of wages due to relative efficiency and would thus seem to give more scope to the influence of relative sacrifice, effort or disagreeableness. Too much importance must not be ascribed to this possible effect. It is mentioned here because it is in general agreement with what, as will be shown later, appears to be the more or less unconscious wage theory of those most active in the origination and early development of scientific management.

III

THE BONUS METHOD AND ITS RESULTS

Most of the current discussions regarding the relation of scientific management to wages center about the payment of a bonus or premium. It is customary in scientific management to offer a premium of some sort in addition to ordinary wages for the performance of the extraordinary day's work prescribed in the task or schedule made possible by standardized conditions. This is justified on the ground that it is "fair" to pay an unusual wage for an unusual day's work: that it is necessary in order to get the workman to accept and utilize standard conditions; that it is possible because of the superior profits of the entrepreneur using scientific management; and that it is a just recognition of superior qualities. In other words, it is justified by its advocates, no matter by what ethical theory of wages it may be tested.

There are those who question the justice of the basis on which the bonus is determined. That basis is roughly the lowest point at which the workmen will consent to accept and utilize the standardized conditions provided for them and thereby accomplish the task set. Experience has shown that for the majority of men and in average conditions this requires a bonus ranging from 30 per cent to about 60 per cent on the ordinary day's wages. They will not attempt to do the task for less than this nor is it necessary to offer them more.

But is this a fair compensation for an increase of output amounting as in some conspicuous instances to two or three hundred per cent? Ought not this increase to be shared equally with the workmen, or even, as some have put it, to be turned over entirely to them? What should be done in the cases, almost as numerous

(except in machine shops), where the increase in output secured is less than the bonus paid and the bonus is adhered to merely in the interest of consistency or because it aids some other feature of administration, has not been suggested. At least I have seen no proposal that the workmen be asked to accept a lower bonus on that account; nor in fact is there any likelihood that such a proposal would be accepted.

That the increased output due to the application of scientific management cannot be credited exclusively to the efforts of the workmen should go without saying; and the theory that the workman is entitled to all the increase regardless of the expenditures of the management necessary to make this increase possible does not call for serious refutation. The basis for the division at any amount less than the entire increase must be either that of necessity, which may be ascertained by test, or that of some hypothetical "fairness" about which there is no substantial agreement. The test of necessity therefore has the advantage of being practicable and easy to apply.

Without going into a discussion of the bases of social ethics, I merely state my belief that justice and fairness are essentially terms for social expediency. In order to secure the exercise of high managerial ability and initiative it seems necessary, as human nature is now constituted, to insure some certain and exceptional reward to the entrepreneur. Unless the manager gets what he considers a sufficient share of the increased productivity due to positive management he will not undertake the expense and risk of developing the system. It is necessary, and therefore expedient and just, that his share of the profits be at least sufficiently large to make it worth while, in his own opinion, to undertake this measure of progress.

Have people
be drawn from
field.

Another question, often urged with critical intent, is whether, when the present extraordinary day's work becomes common and ordinary, the payment of the bonus will continue to be necessary. In other words, when all plants have scientific management, will not unscrupulous managers be in a position to cut wages to their present levels and to use their knowledge of a proper day's output as a more subtle, refined and effective method of driving?

As long as some plants have scientific management and others have not, those which have it can maintain their advantage only with the willing coöperation of the workmen. Scientific management does not work except with the heartiest consent and help of the men under it. To maintain this attitude it will continue to be necessary to pay the unusual day's wage for the unusual day's work. With the establishment of an ever higher standard of living, the practical necessity of maintaining the differential reward for differential abilities becomes increasingly stronger.

It is conceivable tho hardly probable that all plants will some day have positive management. The process of development is slow, due to a number of causes which will be explained later. Further, it is contrary to all historic evidence to suppose that any tendency may be permitted to work itself out to its own ultimate conclusion unrestrained and unmodified. Every movement involves in itself certain counter-tendencies whose force sooner or later becomes so great as to overwhelm the original tendency. This is the meaning of the "law of diminishing returns," taken in its broadest sense.

If these considerations are not sufficient to obviate apprehension, attention may be called to the fact that if all plants should have positive management the worker's protection would continue to reside in two

forces: first, the dependence of the manager on the worker's good will; and second, the individual and organized opposition of the worker to any substantial reduction in his standard of living. Only those familiar with scientific management in operation can appreciate how vitally necessary to its successful conduct is the spirit of willing, cheerful, and contented coöperation. The mechanism of positive management is delicately balanced and may be completely upset by the intrusion of a feeling of unfair treatment. If this protection should prove insufficient, the workman will still have the force of established custom behind him, and in addition the power which his membership in a union, in unionized trades, will continue to give him — that is, provided some basis may be reached on which scientific management and labor unions in their present form may survive together. If there is no such basis (a topic which will be discussed presently) the chances are that labor unionism, at least as it is now organized and conducted, will disappear; but there will still remain the possibility and perhaps the need for some more truly representative and progressive type of labor organization.

Another question often put by inquiring critics is whether the increase of output made possible by positive management does not or would not go on faster than the market can assimilate, thus leading to the wholesale discharge of superfluous employees. By way of analogy reference is made to the sufferings of the chain workers, weavers, and others, and the general distress which accompanied the substitution of power driven machinery for hand operated tools. No very close analysis of this historic episode is usually attempted in an effort to determine just what part the introduction of power machinery did actually play in

the economic disturbances of the first half of the nineteenth century and what share should properly be attributed to the Napoleonic Wars and other political conditions. It is said however that after all due allowance is made for other factors, one effect of the sudden introduction of labor-saving machinery was to throw large numbers of workmen out of their positions and to increase materially the total of suffering. Is there anything about positive management to make one hopeful of more satisfactory consequences?

The development of positive management is not parallel to the introduction of power driven machinery. Machinery is something which can be bought in large quantities, installed and operated on short notice. All it requires is a large market for its product, an investment of capital, and a brief training in its operation. Positive management is a type of organization and a set of principles which must be slowly developed, can be used only by those mentally prepared for it, and during the period of transition and adjustment can be had only from a few individuals whose time and energy are limited. It involves on the part of the management a mental revolution and on the part of the workmen a gradual habituation to new methods.

The number of men capable of developing the system is limited, and on account of the peculiar abilities and opportunities required for the successful prosecution of scientific management as a profession the number of its practitioners has not increased very rapidly nor is it likely to in the near future. Only one per cent of the plants in the United States large enough to warrant its development have undertaken it and in no instance has their increased product been placed on the market before the market was prepared to take it up without disturbance.

Instead of throwing men out of work it has thus far meant the more steady employment of forces in plants where it is used. There has been some redistribution of positions. There has been no reduction on account of positive management in the number of those employed; on the contrary, there have been actual increases recorded. It is safe to say that the displacement of workers which may later be possible with the more rapid spread of positive management will not be comparable in extent and influence with that already experienced in consequence of the access of women to men's occupations which has been characteristic of the last half century.

In order to reduce to a minimum the unavoidable redistribution due to the new methods, it is a policy of positive management, thus far consistently adhered to, to insist on the development of sales in advance of the increase in production. This may be accomplished by any one of several methods whose net result is to maintain even employment by spreading production of seasonal commodities over the entire year and to take up the increase in the productivity of men and machines by putting an article of superior quality or lower price before a larger market. Altho the practitioners of positive management have not themselves as yet given much attention to the problems of marketing and distribution, some of them have pointed out the necessity of developing this field and by their insistence have secured practical results in the way of better methods and larger sales.

It is no reproach to the present group of practitioners in scientific management that they have not attacked and solved the problem of distribution. They have had all they could handle in the problem of production. But it will soon become a reproach to society if the prin-

ciples which have been so fruitful in production are not studied, mastered, re-shaped and applied to the problem of distribution.

A criticism frequently aimed at positive management is that its methods tend to destroy the skill and initiative which are alleged to be the capital of the workman, thus making it more difficult, if not impossible, for him to maintain his position or advance out of his class. The most superficial observation of plants in which the methods of positive management have been fully developed must convince any fair-minded investigator that the criticism is not sustained by the facts. On the contrary, in such plants the skill of the workmen is on the average far above that of their fellows in other establishments; and so far as their capacities enable them to participate either in technical advances or in the exercise of managerial functions, their opportunities are better and more freely utilized in scientific management plants than elsewhere.

In the nature of scientific management it could not well be otherwise. Increased production is secured by superior skill, that is, by better acquaintance with the materials, tools and methods involved and greater dexterity in their manipulation. This is due to two fundamental principles: specialization, making possible a high degree of attainment in a more varied field; and intensive individual teaching of scientifically ascertained methods, developing the capacity of the workmen to its utmost limit. Unfortunately skill is still sometimes confused with variety of attainment. There is a notion that the "all-round" machinist is a skilled machinist. The ability to do a good many things in a trade half well is apt to be considered better evidence of skill than the ability to do a few things perfectly. The contrary is the fact. The methods of training characteristic of the

positive type of management provide the workman with a measurable and demonstrable skill, one of the effects of which is to tone up his standard and make him dissatisfied with a hazy versatility which is unaccompanied with real skill in any detail. With such a standard the workman with inventive ability is enabled in the first place to reach the stage of attainment at which alone invention is worth while, and in the second place to distinguish with accuracy of judgment what invention is useful and practicable rather than merely novel and ingenious.

Initiative, both in invention and enterprise, is found in widely varying degrees. In invention, initiative of the lower grade is if anything all too common. In the vast majority of instances invention proceeds by very short steps from the known to the guessed or desired, and is within the capability of anyone who will take the trouble to familiarize himself with the immediate problem in hand. This is being encouraged and practised every day in scientific management plants. It is desirable when it leads to improvement, otherwise it is a mere hindrance; and it is about as apt to be one as the other. The higher type of invention which comes out of the blue, as it were, is extremely rare and is epoch-making in its manifestations. It is the mark of genius and is not affected by any such factor as a type of management.

Initiative in the sense of enterprise is comparatively rare. Its possession in even a moderate degree distinguishes the entrepreneur from the workman; its presence in highly developed form marks off the daring merchant or captain of industry or of finance from the hum-drum manager of a routine business. The tendency of positive management is to provide unusual opportunities for the exercise of both types of initiative and therefore to encourage its manifestation.

Those whose professional interests cause them to be opponents of scientific management, and some of their philanthropic and academic sympathizers, are fond of alleging that it is a speeding-up device injurious to the health of the workmen. Extensive and frequently repeated investigations have thus far failed to reveal anything to substantiate this criticism. On the contrary, the beneficial results which might be expected to follow from increased wages, steady work, improved working conditions, conscious attention to the fatigue factor, individual training and the necessity of fit physical and mental condition, all of which are essential to the accomplishment of the task as set by scientific management, have been found in fact to follow. The whole aim of positive management is to substitute intelligent economy of effort for unintelligent driving, and such has been its practice. When its critics, confronted with the facts, resort (as has one, at least, to my knowledge) to something in the nature of an intuitive belief that in spite of appearances positive management in some way injures "global efficiency," whatever that may be, it is evidence of the survival of a metaphysical stage of thought into an atmosphere of scientific determination.

The emphasis laid by Mr. Taylor on the value of the "first-class man" has misled many people into the impression that the Taylor system can find no place for any but the exceptionally capable worker. This is due partly to a failure to grasp the meaning of Mr. Taylor's phrase "a first-class man." In positive management a first-class man is one who is adapted to the job he is doing, whether it be digging a ditch, tending an automatic machine, acting as inspector, running a plant or organizing a combination. By applying intelligence and discrimination to the selection of men to fit the individual case and the attention necessary to train them

to the most effective handling of their jobs, positive management aims to make every man a first-class man. It must be said that in practice this has often been the result actually achieved. Obviously this is a very different thing from the selection of the exceptional man and the rejection of the average. It amounts to the development in the average man of an exceptional fitness for his job.

This process has an important bearing on the questions revolving around the employment of the subnormal and the application of minimum wage legislation. At present the weak point in minimum wage legislation is the fact that an employer cannot be expected or compelled to employ people who are not able to earn the minimum wage prescribed. Where that wage is fairly high, such for instance as has recently been established in the brush making industry in Massachusetts, it tends to the elimination of all except those who by superior capacity and knowledge have raised themselves up to and beyond the point at which they earn that wage. The employer has the alternative either of dropping all not yet up to that point or of training them so that they are worth the minimum set. Positive management has shown the possibility, the advantage and the method of such training. It points clearly and demonstrably to the solution of the problem how to meet the interests of the employees, the employers and the general public at one and the same time through minimum wage legislation, namely, by the development of the efficiency of plant, equipment and employees up to and beyond the point where the minimum wage is recognized as a reasonable and possible standard.

The superiority of the results attained by positive management on account of its closer, more centralized, better harmonized, defined and trained organization as

compared with the looseness of household and domestic industry points to a new means of combating the sweating evil. The sweated industries are the happy hunting grounds of the traditional driver. Positive management has demonstrated that applied science and the system of industrial principles based upon it produce results greater than those which follow from driving methods. These results, it need hardly be said, can be secured only under centralized factory conditions.

The methods of positive management also have a bearing on the employment of women and children. Whether the remarkable increase in the employment of women in recent years is a necessary evil or a blessing in disguise is not altogether clear. That it has resulted in grave social loss both through the physical injury to women and to motherhood and also through the cutting of wages in competition with men cannot be denied. The tendency of positive management is to ameliorate to some extent both these harmful consequences. In its regard for the physical fitness and welfare of its employees, it is less likely to develop or tolerate practices whose effect may be personally and physically injurious. In its accurate determination of individual ability and its payment of wages in proportion to the ability thus determined, it reduces the possibility of unfair competition between the sexes. Whether a woman is doing as much work as a man is a question which may be answered objectively and scientifically instead of metaphysically as is the present tendency. Whether women are entitled to equal pay then becomes a question of fact.

Similar considerations apply in even greater force to the work of children. The evil consequences of that work are greater and more indisputable even than in the case of women. On the other hand its inefficiency rela-

tively to men's work is much more obvious. Positive management has already shown in many cases that it does not pay to employ children. It is thus in a position to reënforce, from the "practical" business point of view, the advocates of child labor legislation, whose arguments are usually based on more general social considerations.

IV

LABOR UNIONS

Until recently the problem of the relation of scientific management to organized labor had, as one of its practitioners said, "merely an academic interest." There was no attempt to develop the system in closed shops. In other shops no one inquired or knew whether there were union men or not; nor, if there were such, did they offer any objection to the development of scientific management. About 1910 however, or even earlier, in some of the railroad brotherhoods, the attention of professional labor leaders was directed toward the possibilities of this type of management. Their reaction was unfavorable; but except for the refusal of locomotive engineers to accept the bonus proposals on the Santa Fe railroad, no opportunity to express their organized opposition to scientific management presented itself until that system was extended to a detail of the Watertown Arsenal, which is part of a highly unionized branch of the government service. This was seized upon by the leaders, apparently without regard to the real feelings of the men or the facts in the case, as the occasion for a brief and insignificant strike and a long train of government investigations, reports, petitions, and bills in congress, whose aim is to discredit positive management generally by setting on it the stamp of governmental disapproval. In the last congress this agitation was

partially successful, altho the labor leaders seem to have gotten through the wrong bill. The affair has at least been of sufficient importance to convert the question from one of academic interest to one of general industrial and economic consequence.¹

The traditional attitude of the practitioners of positive management is based on strong practical considerations of which they are fully cognizant, and on an economic theory which is rather implicit in their discussions. In general they admit certain historic advantages in trade unionism, such as the gradual shortening of hours, the improvement of working conditions, and the maintenance and raising of wages. They admit that labor organization is still necessary to secure and maintain these advantages in plants not using positive management. But they insist that positive management provides these advantages to the working man more quickly, more certainly, and in fuller measure, than labor organization ever has done or can do. Reduction of hours is a not uncommon practice under positive management. The standardization of conditions to the point of economic perfection is a fundamental principle. Wherever positive management prevails, basic wages are maintained as a matter of expediency, and are raised by the extent of the bonus. These results are brought about quickly, and without dispute or trouble. Why then, they ask, is labor organization necessary?

The advocates of positive management do not stop, however, with this negative position. They maintain that certain of the present principles and practices of labor unionism are not only incompatible with the fundamental principles and practices of scientific manage-

¹ As is recognized by the fact that the United States Chamber of Commerce has appointed a committee, in response to this agitation, to investigate the subject once more.

ment, but are subversive of the public interest. This criticism applies to such practices as restriction of output, insistence on a uniform wage, collective bargaining on matters which are questions of fact rather than of opinion, restriction of membership, and the closed shop.

Socially controlled restriction of output may under some circumstances be advisable, as when there is regulation of the acreage to be sown in wheat or cotton or of the amount of coal to be mined year by year. The movement for the conservation of natural resources is a form of restriction enforced in the broad public interest. This is an essentially different matter from privately controlled restriction, whether by the entrepreneur or the workman. Such restriction may be of temporary advantage, maintaining profits for awhile for the entrepreneur and possibly maintaining wages and postponing unemployment for awhile for the workman. Both these results, however, are temporary and of individual benefit. Scientific management aims fundamentally at the increase of the national dividend, which any form of privately controlled restriction aims to reduce. Scientific management, while recognizing that over-production may occur as an accidental result of uncoordinated industrial activity or of the friction and groping of distribution, denies the possibility of real over-production in the sense of an excess of consumable goods over the needs of society. Positive management opposes the lump of labor theory, and insists that the more economically work can be done the greater will be the demand for it and the more highly rewarded the workers. And there is no question that increased production at lower cost per unit is desirable, at each successive stage, from the point of view of the entrepreneur producer.

Altho labor unions are becoming less and less willing to acknowledge restriction of output as a fundamental

policy, there can be no doubt that such restriction is their constant practice and that in the back of their heads it is their final answer to the problem of unemployment. For the individual workman in the individual plant much is to be said for their theory. If the plant has orders for a hundred units, the men's jobs will last ten times as long if they take ten days instead of one day each per unit. The broader social consequences of this type of restriction work out slowly and react only in the most obscure ways on those who practise it, while its immediate personal consequences are obvious and apparently advantageous. Even if the workman sees the ultimate social disadvantage of this policy, he can hardly be expected to sacrifice his present personal advantage to a remote social good.

Inasmuch however as one of the fundamental aims of positive management, and a necessary result of all its practices and methods, is the increase of output, there is here, in the absence of centralized social control of production, an irreconcilable conflict. It would appear that the ultimate social as well as the immediate industrial advantage is on the side of positive management and that, as it cannot surrender its fundamental principles, it must continue to educate society to the advantages of large output and to fight all efforts to restrict it.

There is an equally fundamental conflict between the trade union principle of a uniform wage based on class similarity and the positive management principle of a differential wage for differential abilities.

Positive management accepts the wage current in the community as its basic wage, and so long as general conditions remain substantially the same, considers that this wage should be paid uniformly to all workmen for an ordinary day's work. Some of its practitioners may question theoretically the justice of these current rates.

While their theories have apparently not been thoroughly reasoned out nor stated with any great clearness, there appears to be among them a feeling that basic wages should be related to each other in proportion to the disagreeableness, sacrifice, or "cost" of different occupations, scientifically determined. One proposes that this determination shall be on the basis of foot pounds of energy expended, another on an estimate of the relative total disagreeableness or irksomeness of jobs. These theories are not pressed very insistently, however, nor is there much tendency to question the justice of the current rates. On the whole they are felt to depend upon some rather hazy "law of supply and demand"; and in any case the validity of this law, if there is any, is outside the practical scope of a scientific manager's business. He accepts current wages as they are, as the basis on which to build a differential payment for differences in ability.

For on the theory express or implied that wages should be proportionate to productive efficiency, it is agreed among all scientific management experts that it is both just and necessary to pay more than an ordinary day's wage for an extraordinary day's accomplishment such as is made feasible by their methods. It is necessary, as already explained, because otherwise the workmen will not perform the unusual day's work. It is just, because it tends to encourage the exercise of superior abilities to the ultimate benefit of society; whereas a uniform wage tends to reduce the effort of all men, whatever their capacity may be, to the level of the least efficient man who receives the uniform wage. There is also a feeling, scarcely reasoned out or defined, that the workman should in some way share in the increased product secured at least in part through his efforts. In any case there is a thoro conviction that differential

wages are essential to the practice of positive management and that therefore the trade union principle and practice of uniformity is absolutely unacceptable.

The objection of positive management to collective bargaining rests theoretically on the incompatibility between bargaining and the accurate scientific determination of facts, and practically on the numerous difficulties thrown in the way of the reorganization of a plant by recognition of labor unions as at present led and conducted. Positive management endeavors to build up the principles of industrial organization as well as the science of industrial conservation upon a basis of ascertained fact, where possible; and it declines to admit that any facts pertinent to the discussion are not ascertainable. Bargaining implies difference of opinion and compromise until a basis of agreement is reached. You do not bargain about or vote on scientific facts. If the ideals of positive management are realized, therefore, the field left open for collective bargaining is narrowed to those matters which cannot be, or at least have not been, reduced to law.

In the opinion of some this eliminates altogether the possibility of collective bargaining; for they believe there is no factor, not even the basic wage rate, which cannot be reduced to accurate scientific determination, even if such determination is only the resultant of an unanalyzed "law of supply and demand." Others (of whom I am one) believe that while the basic wage rate is doubtless determined by some law, natural or social, the law has not yet been accurately and comprehensively defined; and that therefore, theoretically at least, the basic rate of wages may be a subject of bargaining. But there is complete agreement that such matters as the process to be used, or the time which it should take to perform a given piece of work, and the amount of

bonus which is to be paid for its performance within a standard time, are questions of fact, and therefore not in any sense subject to collective bargaining.

More important, however, than the theoretical consideration is the circumstance that collective bargaining under existing conditions requires a recognition of the union and thereby brings in its train a series of difficulties and conflicts which might be avoided altogether by consistent refusal to deal with organized labor. The bargain on basic wage rates, even tho theoretically consistent with positive management, does in fact involve many details of organization such as the length of the working day, the employment of men or women or children, and the determination of what constitutes the (customarily ordinary) day's work. Further, such a bargain opens the way to "dickering" over many other details such as the degree of specialization to be required, the functions and authority of minor executives, the principles governing inspection and the reduction of defective workmanship. All scientific managers will testify that at best the difficulties of their work are extreme, not to say heartbreaking. To complicate them with the necessity of conferring with committees of workmen not in the slightest degree familiar with the principles of management or the details as they are being worked out in the plant under process of systematizing, would be wellnigh fatal.

To this difficulty must be added the well grounded fear of abuse of the striking power of organized labor. Whatever may be said in favor of the strike as a weapon to secure, under the current types of management, the reasonable demands of the workmen for shorter hours, higher pay, or better conditions, it is difficult, if not impossible, to justify the sympathetic strike and its even worse variety, the strike that grows out of jurisdictional

disputes. The manager who by reason of his standardization of conditions, payment of higher wages, fair treatment of his employees, and development of a type of organization which renders jurisdictional disputes almost meaningless has removed practically all the tenable grounds for striking, is justified in his fear of mere sympathetic and jurisdictional strikes.

The manager's aversion to recognizing a union is still further intensified by his distrust of the type of leadership which is characteristic of much of American labor organization today. Even its friends must admit that the American Federation of Labor is governed and controlled by a type of leadership marked rather more by political ability (in the objectionable sense) than by a broad-minded, socially trained public spirit. Exceptions must doubtless be made to this general judgment of current labor leadership; but that it is substantially accurate cannot be denied by anyone who faces the unfortunate reality.

A great many union men are now working in scientific management plants. The organized complaint against this system which has had so much publicity comes from an insignificant fraction of the union men actually working under it, and there is at least reasonable ground to believe that the real feeling of even that fraction is misrepresented in the complaints officially emanating from them. If this is true, it is but a testimony to the fundamental reasonableness and intelligence of the average working man. The practitioners of positive management have every means of knowing and have always insisted on a recognition of this native reasonableness; and if it could always be found in the same degree among the "leaders" who would represent these men on committees for purposes of collective bargaining, the present unwillingness to consider even

the possibility of such bargaining would rapidly disappear. Under existing conditions, however, every day's experience provides additional practical arguments against collective bargaining.

The labor union policies of restriction of membership, limitation of apprentices, and the closed shop, are all, as at present practised, contrary to the principles of positive management, for reasons too obvious to call for discussion. The principle of organization on craft lines, as exemplified in the American Federation of Labor, is also incompatible with the tendency of scientific management to substitute a classification of labor on the basis of efficiency and teachableness for a grouping on the basis of trade or occupation. This tendency is in fact the most irresistible weapon that scientific management now opposes to the current type of labor organization as represented in the American Federation of Labor. To those intelligent enough to distinguish the real principles of syndicalism from its crudities it will be apparent that the I. W. W. represents more modern tendencies and, unless it is killed by its abuses, has a more promising future (partly because of its greater consonance with the principles of positive management) than the American Federation.

In the light of this discussion it would appear that scientific management in its present form and organized labor as represented in the American Federation in its present form cannot persist together. One or the other must be modified. If history may be relied on to repeat itself, it is safe to prophesy that positive management, on account of its superior economic advantages, will compel the revision of labor organization, while itself not entirely escaping the necessity of some modification.

It is conceivable that labor organization may shift its basis from restriction of output, uniformity of wage and

restriction of membership to an acceptance of the principles of maximum output, wages in proportion to ability, and freedom of membership, while still retaining its fundamental and necessary power to help determine the minimum wage rate and the minimum working conditions through the instrumentality of some mechanism in the nature of a collective bargain. If bargaining is, as I believe, the determining factor in the establishment of the basic wage within certain limits, there will always be a need for organization of employees to enable them to offset by their combined strength the strategic advantage of the employer due to his initiative in hiring and his control of the purse strings. The features of current trade unionism objectionable from the point of view of positive management and, as I believe, from the social point of view, are unnecessary to the existence of labor organization in the interest of the maintenance of minimum rates and conditions. Furthermore the labor politician in his present stage of evolution is not only unnecessary, but is an active detriment to the fulfillment of the best purposes of labor organization. For the development of collective bargaining on a basis of fact instead of compromise of opinion, labor organization must secure and maintain a radically different type of leadership from that which it now has. To this end all it has to do is to scrutinize its present leadership carefully, appreciate how misrepresentative and misleading some of it actually is, and substitute for that element a genuinely representative leadership that is law abiding, fair in intention, socially minded, honest, intelligent and interested in the permanent welfare of its constituents.

On the other hand, as positive management extends from the plants which are entirely non-union shops, or are at least open shops, to those in which unions are

strongly organized or even dominant, it will be incumbent upon it to recognize the necessity of some kind of coöperation. Even if this universe is as deterministic as some exponents of positive management insist,¹ the laws governing social and economic relations and the interaction of individuals on each other are not yet formulated; and until they are, there must remain a place for bargaining. Positive management must recognize also its two-fold character as a collection of laws on the one hand and as a set of principles on the other. The laws of science are not determined by counting heads; but principles of conduct in a free society can be enforced only by the consent of those affected. If this consent requires the coöperation of organized labor, so be it, provided this coöperation does not involve the sacrifice of fundamental industrial and social principles.

Scientific management, in spite of some of the claims of its more enthusiastic advocates, is not an industrial panacea. It cannot put an end to industrial unrest so long as personal and economic friction and inequality of income and opportunity persist. It is well that this is so, for complete content would be stagnation. On the other hand positive management does narrow the field of unrest and tends to refine the methods by which discontent makes itself audible and effective. It clarifies the issues between labor and capital, makes them more definite and more closely circumscribed. This process reduces the number of possible disputes and at the same time increases the possibility of arbitrating those that are left. In the long run this means less warfare and bitterness and more substantial justice to both sides.

¹ See preface to the French translation of Taylor's *Shop Management* by Henri Le Chatelier; reprinted in Thompson's *Scientific Management*, p. 842.

Some time ago I suggested that the labor unions in their own interest should advocate and compel the adoption of positive management in those plants in which they could make their influence most felt.¹ I have since come to the conclusion that this is utopian. Before it can be done there must be a new type of leadership, and those policies of organized labor which are incompatible with the fundamental principles and practices of positive management must be abandoned. Further, the necessary unanimity of action on the part of all trades in a plant can be secured only by the "industrial" type of organization — represented perhaps by the I. W. W. — not by that exemplified in the American Federation of Labor.

I still believe, however, that the tendency is in this direction and that it can only be postponed and not diverted by the active opposition of labor leaders and by public interference such as was attempted in recent congressional legislation. In the long run the effect of such interference is helpful to positive management because of the publicity given it and the evident importance attached to it even by those professionally opposed. In industry, as in religion and politics, there is nothing like persecution to aid a cause which is inherently good.

V

LARGER SOCIAL PROBLEMS

What progress has positive management made or is it likely to make toward the solution of larger problems, such as the reduction of unemployment, the improvement of education and skill, the smoothing out of in-

¹ See C. B. Thompson, "The Relation of Scientific Management to the Wage Problem," *Journal of Political Economy*, vol. xxi, p. 630. Reprinted in Thompson, *Scientific Management*, p. 796. Cf. Croly, *Progressive Democracy*, pp. 309 ff.

equalities of income, and the development of democracy in industry? Its originators and advocates claim the solution of these among its fundamental aims. It is altogether too early to give a just appraisal of its actual effect on such matters; but it may be advisable to consider just what positive management does contribute toward the complex of factors bearing on them.

On the problem of unemployment positive management has already contributed valuable experience and has pointed out the way in which a partial solution may be found. One of the greatest causes of unemployment, aside from the maladjustments due to crises and panics over which positive management can have no control, is the seasonal fluctuation in demand found in so many industries. From the point of view of positive management these seasonal fluctuations mean exceptionally high cost of production during periods of activity, due to the sudden access of workers who have to be trained quickly and to the multitude of rush orders that interfere with the steadiness of administration under which any system works most effectively. Positive management has therefore insisted on equalizing the demand. This is done by offering special inducements to customers to place orders that can be executed during the otherwise dull periods. The cost accounting methods which propose to equalize the cost of production by charging the loss due to unused plant and equipment directly to profit and loss rather than to the cost of production, do not relieve the management of the necessity of taking up this loss by more effective marketing. The results of the policy insisted on by positive management are steadier employment for all workers and less fluctuation in the earnings of piece workers. This is promoted by the policy of training employees in different kinds of work, so that when the demand slackens in one depart-

ment they may be easily transferred to other departments in which the demand is greater.

There should also be noted the effect of the higher wages that accompany positive management. In the first place it tends to reduce the restless wanderings of employees from plant to plant, which is one fruitful tho comparatively unexplored cause of unemployment. In the second place steadier employment, by increasing the value of the employee to his plant, tends itself to raise his wages still further. This improvement when properly utilized by the management reacts again on the cost of production, ultimately in some cases on the selling price and the demand for the product, and finally back again on the demand for workers.

As yet positive management has not in fact seriously affected the problem of unemployment. It is safe to say that it has in no case reduced the number of men actually employed, while on the other hand it has in several instances increased that number. Either result, however, has affected such a small number of plants as to have been but an insignificant factor, compared with those larger and vaster economic forces whose effect is registered in the number of the unemployed.

Closely connected with the problem of the unemployed is that of the education and skill of the employee. In periods of decline in business the men first laid off are those who are the most costly, and as a rule these are the relatively uneducated and unskilled. What effect has positive management on this problem?

Efforts to revive apprenticeship, either in the old form under master-workmen or in the new form of apprentice schools, may by this time be set down as failures. Today there is practically no such thing as a master-workman who is acquainted with all the tradition of his handicraft. Practically all workmen are specialized and the

utmost they can teach is the little specialty they have learned, a specialty which in many instances can be taught in a few days or even in a few hours. The apprentice schools attempt to give a smattering of all-round acquaintance with the job. When they are connected with plants they reduce this as much as possible, plunge at once into specialized training, teach the youth to do a limited job, and keep him doing a man's work for a boy's pay as long as practicable. When they are not connected with industrial establishments they go to the other extreme and teach a mass of traditional technique and theory, often with the aid of antiquated and obsolete equipment, which is useless and promptly forgotten when the youth is confronted by a real job under commercial conditions.

Positive management changes all this. Power driven machinery had already increased output by the substitution of mechanical power, speed, and endurance, for the corresponding human qualities. Positive management goes further and increases output by the mastery of the natural laws involved and by increasing human skill and control. The effect of positive management therefore is to put a premium on personal capacity and development. This it does by its policy of individualized and intensive training, specialization, and the substitution of definite high standards of accomplishment for the old feeling of all-round but indefinite capability.

This policy of course gives occasion for complaint about the effects of ever greater specialization. Since the industrial revolution began it has been considered proper to mourn the disappearance of the traditional all-round artisan. But is his passing really a misfortune either for himself or society? In the first place it is doubtful if there were very many of him. To be versatile

is not difficult, but to exhibit great capability in versatility is rare. If we may judge from their modern representatives, most of the all-round artisans were more versatile than capable. In the second place, the all-round artisan was content with a standard of accomplishment which is far lower than that expected of and by his modern specialized successor. The workman who today does one comparatively minute operation and does it with superlative excellence is, in his own opinion and that of society, a stronger and more capable man. His standards are raised and with it his self-respect and the esteem in which he is held. It may be pointed out further that the increasing development of specialization makes possible the discovery and training of exceptional capacity along special lines which might otherwise be obscured by the variety of duties imposed. Specialization in foremanship opens a new field of promise to many who were heretofore known as ordinary workmen. The tendency of positive management is to recognize the fact that most men are ordinary, and provide for the most effective coöperative utilization of ordinary capacities. Its chief means for the accomplishment of this purpose is specialization and intensive individual training.

It is hardly necessary to add that this argument does not go so far as to propose the elimination of general and trade education. The social and political justification of such education remains as strong as before. Moreover, the tendency to substitute a knowledge of fact and of law for guess work and tradition demands a degree of general intelligence and education which was quite unnecessary under the old methods of production. Positive management adds a quantitative value to education.

The effect of positive management on inequality of income has been suggested in former parts of this dis-

cussion and will be summarized here. The increase in the supply of managers (at least of the routine type) will, in the first place, reduce the wages of management. At the same time it will increase the demand for capital; and this, together with the greater productivity of the capital employed, will tend to raise the rate of interest. A similar increase in the demand for workmen and in their productivity will raise general wages. The two consequences are compatible because the sum total of the "national dividend" will be larger. At the same time the sharper differentiation of individual abilities and the payment of wages in proportion to efficiency will tend to maintain and even to raise wages still higher.

Certain of these tendencies are permanent, others but temporary. The increase in the supply of managers and the differences in ability of workmen will doubtless remain. The higher rate paid for capital however will tend so to increase the amount of it that becomes available as to result eventually in a return to the previous rate of interest; so that in the long run, if the tendencies of positive management were allowed to work out freely and without interruption, rent and profits, in the narrow sense, would be unaffected, interest would first rise and then fall again, wages of management would tend to become less, and workmen's wages higher. These are obviously steps toward greater equality of income than now prevails.

A question of concern to many is the probable influence of positive management on the tendency toward democracy in industry. What is meant by democracy in industry seems to vary with different thinkers and with the same thinker at different times. We will assume that it means at least a share in the control of industry and free opportunity for advancement.

An industry which is governed by facts rather than by traditions and opinions is fundamentally democratic, at least in the sense that it is immaterial whether the fact is produced by the general manager or the humblest lumper. Arbitrariness on either side is eliminated. Any workman may appeal to the arbitrament of facts with the same certainty of justification as the highest official. In this sense control becomes impersonal; which is a step in advance from the current type of arbitrary personal control.

On the other hand, with the increasing specialization of modern management a greater degree of centralized control is necessary than ever before and this control must ultimately be exercised by one human being over another. To those who consider any degree of restriction of individual liberty, even in the interests of a co-ordinate activity, a derogation of democracy, positive management must be undemocratic; in fact any management must be. So is any type of government. The only alternative is anarchy. If this extreme view is not held, the question becomes whether the control whose necessity is admitted shall be exercised by persons chosen by the controlled or by some other agency. Experience with coöperative productive enterprises has shown the present impracticability of the selection of industrial leaders by the rank and file of the employees. On the other hand, a long history of favoritism, nepotism, indifference and ignorance has shown the inadvisability of arbitrary selection by owners and managers. Positive management provides a method of selection by capacity. In other words, its type of government is that of an aristocracy of demonstrated ability, tempered by the necessity of retaining the good will of the employees without which the methods of positive management cannot be successfully operated, and further

ameliorated by the type of discipline which wells up from beneath and is at least partially self-enforcing.

That such is in fact its result is evident to anyone investigating a plant in which positive management has secured a firm foothold. The executives are but slightly removed from the ranks of the workmen and are in fact as well as in theory the servants of the men. The men occupy a new position of power and responsibility of which they are fully cognizant and have even been observed reminding their "bosses" of any failure in the adequate performance of the bosses' duties.

The characteristic regard for impersonal fact, the greater mobility between ranks and the keener appreciation of individual abilities, characteristic of positive management, provide opportunities for advancement far greater than those commonly observed. There are large differences in the capacity of manual workers. These differences are made evident by time study, are immediately recognized, and the capable workman is an object of exceptional esteem. A long-run effect of this is to transfer esteem from the workman to the work as such and to increase the self-respect of workmen and their regard for their personal rights and corresponding obligations. All these would seem to be in the direction of a sane democracy.

Unless scientific management has before it a long and influential future all the foregoing discussion has a merely academic interest. It has established a firm foothold in the short period of its existence. Whether it will live and grow depends upon whether its inherent advantages can offset some of the difficulties now in the way of its development.

Chief among these obstacles is the conservatism and mental inertia of business managers. Business is proverbially cautious, one might almost say unprogressive.

Managers consider that even in the beaten paths the risks are great enough; and it is only the exceptionally bold or the rash who will step out into the unknown, even tho it may look promising. As success after success is scored by the pioneers, ordinary managers get over their timidity. Today there is evidence of an almost undue haste to adopt the new methods. The demand for scientific management has brought forth a horde of "efficiency experts," untrained, incompetent, sometimes quacks and charlatans, whose operations are tending to discredit the name and purpose of the movement. This phase shows signs of passing and we seem to be settling into a period where the progressive but skeptical manager is coming to the front, who must first be convinced, and when convinced commits himself to the patient development of real science in his plant.

Another obstacle is the cost of the best-known systems, owing to the scarcity of experts capable of developing them and the necessity of finding out, by expensive experiment, the very A, B, C, of the science of each new industry to which the methods are applied. The cost of the first few steps which are now being taken is so high that only plants able and willing to make an investment of \$30,000 or \$40,000, without the expectation of large returns for two years or more, are in position to undertake the development. This obstacle also tends to disappear as experience demonstrates the certainty and largeness of the returns from such investment.

The scarcity of engineers capable of developing positive management also retards its extension. At present it is safe to say that there are not over twenty in the entire country. As all of them give their time personally to the development of their work, this puts a serious limitation on the number of plants that may avail

themselves of their services. The only remedy is the discovery and development of younger men in the same field. There are signs that since the death of Mr. Taylor the liberal policy of the originator of scientific management is being restricted somewhat by his immediate followers. The attention given to the subject in the colleges and business schools of the country, and the increasing demand for specialists in this work, will aid in overcoming the difficulty.

To a certain extent the distrust of social workers and the opposition of organized labor tend to retard the movement; but on the whole it is my impression that the publicity resulting from active opposition, when followed by investigation and publication of facts, as it usually is, tends on the whole to aid it. There can be no question that the recent congressional debates on scientific management in the Watertown Arsenal case, uninformed as on the whole they were, called the serious attention of business men to the actual facts regarding the Taylor system, with the net result of an increasing interest and a desire to secure its advantages.

This enumeration of the obstacles to the development of positive management betrays their smallness and transitoriness in comparison with the greatness and permanence of the forces with which its progress is allied. Already it is demonstrating its capability of great industrial and social advantage to its users. Its close relationship to the movement for the conservation of all resources has been pointed out and its far-reaching consequences as an agency for the conservation of human effort have struck forcibly the popular imagination. Finally its inherent democracy as exhibited in its substitution of fact, so far as possible, for the vagaries of personality, and its provision of self-government and unlimited opportunity for advancement, tie it closely to

the most intelligent political movements of the day. While it would be idle to deny that there are counter-tendencies to all these and that there have been abuses and misinterpretations of the principles of positive management,¹ it seems safe to believe that on the whole it represents an inevitable and irresistible tendency, and that therefore its extension and permanence are assured, so far as, historically speaking, there may be assurance of permanence.

C. BERTRAND THOMPSON.

SCHOOL OF BUSINESS ADMINISTRATION,
HARVARD UNIVERSITY.

¹ The discussion of positive management in the recent book of Hoxie, Valentine and Frey, *Scientific Management and Labor*, seems to rest on a consideration chiefly of abuses and inadequacies of the movement.

THE NATIONAL FOUNDERS' ASSOCIATION ¹

SUMMARY

The National Founders' Association is typical of those American employers' associations which advocate the open shop, 353. — Development of the policy of the Association, 354. — Methods of defending members against the demands of the Union, 357. — Administration of the defense system, 364. — Classification of membership in the Association, 370. — Requirements for admission, 372. — Government and financial system, 377. — Constructive activities, 383.

EMPLOYERS' associations in the United States formed for the purpose of dealing with or opposing organized bodies of workmen are of comparatively recent origin, but in the last fifteen years they have become a factor in industrial relations which is not to be ignored. Each December the Stove Founders' National Defense Association and the Iron Molders' Union hold a conference at which are determined wages and conditions of employment in the stove foundries for the succeeding year; the glass manufacturers meet representatives of the several glassworkers' unions annually; the coal operators in the southern and southwestern coal fields have a series of written agreements with the United Mine Workers of America. In these and several other industries which might be mentioned, the system of collective bargaining developed between the manufacturers and their men has resulted in the maintenance of a permanent industrial peace.

¹ The material presented in this paper was in large part collected by the writer while she was an agent of the United States Commission on Industrial Relations. It consists almost entirely of manuscripts and other documents in the possession of the National Founders' Association and the Iron Molders' Union. The examination of manuscript and printed material has been supplemented by visits to a number of foundries, and by interviews with Union and Association officials. To the generous coöperation of these latter is due much of whatever merit may be possessed by this and other studies to be made of the relations of Union and Association.

On the other hand, a number of organizations of employers exist almost exclusively for the purpose of resisting collective bargaining and recognition of the unions, on the theory that where the complete autocracy of the employer is preserved, the interests of all are better cared for than under any scheme of industrial democracy yet devised. Nor has this conclusion been reached by purely deductive reasoning on the part of those who take this position. One of the most significant features of their program is that it is based upon a wealth of experience, for of the employers' associations active in opposing the advance of the unions, some of the most important are those which have attempted to operate under agreements with organizations of their men, and after affording the system a trial, have found it unsuited to their needs and unadaptable to their industries. This is true of the National Metal Trades Association which now refuses to deal with the Machinists' Union, of the National Erectors' Association which will no longer countenance the International Association of Bridge and Structural Iron Workers, of the National Founders' Association as regards the Iron Molders' Union. In addition, the influence of these failures has spread to non-trade organizations of employers such as the Anti-Boycott Association, the National Association of Manufacturers and the Citizens' Alliances which have incorporated in their policies a definite defense against union aggressions of every kind.

The oldest and in some ways the most interesting of these now hostile trade organizations of employers is the National Founders' Association, whose membership comprises nearly five hundred manufacturers of cast iron specialties in the United States and Canada, employing approximately one-eighth of all the molders and coremakers in the country and producing a consid-

erable proportion of the output of heavy machinery and lighter iron castings. The story of this organization's struggle with the Iron Molders' Union must always be an important chapter in the history of the American labor movement. Formed in 1898 for the distinct purpose of substituting for the prevailing industrial war, a policy of coöperation with the Union, as had been so successfully done by the employers in the stove branch of the foundry trade, the National Founders' Association the next year entered with enthusiasm into an agreement with the Union to arbitrate¹ disputes and thus do away with strikes and the other annoyances characteristic of a union dominated industry. But as the months went by, this instrument designed for peace seemed to bring only an increase of trouble. Misunderstandings as to its purpose and the method of its operation, combined with actual if not especially glaring violations of its terms on the part of both organizations, soon served to bring about great dissatisfaction. Yet for nearly six years the prescribed form of negotiations was gone through and an honest effort was made by Association and Union to reach a mutually acceptable method of procedure. When at last it became clear that there was no ground on which both could meet, the Association abrogated the agreement and attempts at collective bargaining were abandoned.

It was perhaps unfortunate that relations with the Union were undertaken by the National Founders' Association before its fundamental law and administrative machinery were fully competent to handle the problems this relationship entailed, but in developing

¹ The word "arbitration" as applied to the settling of labor disputes was originally used to designate all forms of conferences between employers and employees. In the case of the Iron Molders' agreements with both the Stove Founders' National Defense Association and the National Founders' Association the system required pure conciliation, the board being composed of an equal number from each side with no provision whatever for real arbitration involving the calling in of an odd man.

the technique as well as the policy of the Association to its present high standard of efficiency the experience with the Union played an important part. As will appear in the following pages, it was not until 1904 and the abrogation of the agreement that the policy of the Association was firmly established and the governmental, financial and defense systems completely worked out. Since that time, no change worth mentioning has been made in either structure or method and the Association today is practically what its intercourse with the Iron Molders' Union has made it. It is the purpose of the present paper to describe its structural evolution, but in presenting the facts as to the development of its procedural mechanism no attempt has been made to pass judgment upon the justice of the position it has assumed or the principles for which it stands.

The objects of the National Founders' Association as stated in the constitution are "1st — The adoption of a uniform basis for just and equitable dealings between the members and their employees whereby the interests of both will be properly protected. 2nd — The investigation and adjustment by proper officers of the Association, of questions arising between members and their employees." This purpose has never changed in the seventeen years of the Association's existence, but the means by which it is to be accomplished have altered considerably.

At first, there was no definitely expressed policy beyond a determination to band together the foundrymen of the country for the purpose of ridding themselves of many of the working conditions which long years of effective unionism had established in their shops and of preventing further encroachments from that source. In place of union rules as the controlling

force in fixing shop conditions, it was desired to establish those "general principles of freedom to employers in the management of their works" recognition of which the British manufacturers in the industry had just obtained in an agreement with their men. Nothing in this, however, implied any intent to crush the Union. Indeed, there was no hostility on the employers' part except to those practices which it was believed had proved detrimental to their employees as well as themselves. Could these be eliminated, and the good which was known to inhere in organized action be molded to the employers' ends, it was thought the workmen and the industry would both benefit.¹

The model of procedure first followed was that used by the Stove Founders' National Defense Association, whose constitution was in many parts copied almost verbatim and whose policy of agreements with the Union served as the inspiration for the newer organization's attempt to reach a satisfactory system of collective bargaining. But these were no sooner tried than they proved in some rather serious ways to be unsuitable. The constitutional misfits were remedied as the need became apparent; the difficulties with the Union were much more fundamental. It was soon discovered that the freedom from labor troubles which the Stove Founders had secured through their agreement had been purchased at the price of surrendering a considerable share of the control of the industry, that instead of shaking off union rules and a never before recognized

¹ Proceedings of the Meeting of the Foundrymen, New York, January 26, 1898; William H. Pfahler, *History of the National Founders' Association* (ms.); Proceedings of the Conference between the National Founders' Association and the Iron Molders' Union of North America, New York, March 8, 1899 (ms.), pp. 5-6; Proceedings of the National Founders' Association, Buffalo, February 1, 1899, p. 4; *ibid.*, Niagara Falls, August 9, 1899, pp. 41, 45; *ibid.*, New York, November 13, 1901 (ms.), pp. 76, 123; *ibid.*, Washington, November 11, 1903, p. 5; *ibid.*, Cincinnati, November 16, 1904, in *The Review*, December, 1904, pp. 7-8, 36; National Founders' Association Confidential Circular No. 6.

participation in shop management, agreement had come to mean in the stove foundries, legitimized co-partnership of authority and administration.

Such a system the National Founders' Association had never contemplated, nor were its leaders convinced that conciliation necessarily implied such a yielding to the Union as the stove men had granted, with what they considered to be so little given in return. During the years of bargaining which followed, there was evident on the part of the Association a willingness to make certain concessions to the Union if its members were to receive commensurate benefits. But all attempts to reach a mutually acceptable set of working rules were balked by the Union's inability to give up or modify any part of its fundamental law. This attitude on the part of the Union may not have been without some justification, but the fact remains that the original plasticity of the Association's policy gave way gradually to a rigidity which made it as unarbitrable and unsusceptible of compromise as that of the Union, and whereas in 1900 the cardinal principles according to which the Association desired to operate were presented mainly as a suggestion of certain features to be embodied in an agreement, since 1904 they have served as an ultimatum whenever Association and Union have come in conflict.

Briefly summarized, the Association's *outline of policy* declares against union restriction of output, union limitation of the earning capacity of the employee, union limitation on the employment of apprentices, union imposition of fines and restrictions upon workmen. It is in favor of a fair day's pay for a fair day's work, the right of the employer to hire whomsoever he sees fit without regard to union affiliation, the operation of molding machines and approved appliances without

restriction, the education of the American boy in the trade of molding without union interference. Instead of representing its members in a collective capacity to negotiate with their men for the terms of employment, the Association has become in reality a mutual insurance organization whose members are protected against the excessive demands of the Union and receive aid in upholding in their shops the principles for which the Association stands.

Altho the original law of the Association, combined with the almost immediate ratification of the agreement with the Union, made ample provision for the elimination of cessations in the industry through the use of conciliation in the settlement of disputes, the Association was so organized that it could fight if occasion required, and in spite of all efforts to maintain peace, recourse to active defense measures was frequently thought to be necessary. When relations with the Union were broken off entirely, altho the Association continued to endorse the principle of employer and employee getting together to talk over disagreements, its protective work was still further developed and systematized.

The by-laws have always stipulated that when a member had a dispute with his employees which neither he nor representatives of the Association could settle and in which the latter believed he should receive support, he might be defended in one of three ways: *first*, by procuring men for him who would take the place of the strikers; *second*, by affording him compensation for loss of production; *third*, by making such work as he might require.

In practice, securing molders to take the place of strikers has been the method of defense most generally used. Very early the plan was devised of issuing to

those men who had been faithful to their employers in time of labor troubles, a "card" or certificate of loyalty which was to secure for them the special consideration of all members and which at the same time made available for the Association a somewhat permanent force of strike breakers. The cards were accepted by the men with the understanding that they were issued by the Association and remained the property of the Association, to be revoked and recalled at pleasure upon evidence of breach of faith on the part of the holder. Whenever a man took employment with an Association member he deposited his card with his employer to be returned to him at the termination of his contract if his service had been satisfactory, or turned over to the secretary of the Association with a statement of the circumstances for investigation in case his conduct had not been such as befitted the bearer of such a recommendation. It was not intended that card men should remain in the foundries of members as permanent employees, but should be used simply to break a strike and then be moved on when the trouble was over and the regular force returned. In the two big strikes which were handled with this system of defense, seventy-five per cent of the strike breakers used in the second were card men who had been employed in the first,¹ which would seem to indicate that the men were pleased with the arrangement and that for the Association it provided a means of getting molders much more satisfactory than the usually resorted to newspaper advertisements and employment agencies.

It is not known exactly how many of these cards were issued. The first were given out during the Cleveland strike of 1900, and in the following May immediately after the settlement of that dispute, it was reported that

¹ Report of the Secretary, N.F.A., November, 1901 (ma.), p. 30.

two hundred and twenty-one were held by men who had worked for the Association at least sixty days.¹ By November, 1902, the number had increased to four hundred and thirty-one.² Altho the practice of issuing cards was continued for some time longer, it is probable that not many more than this were given out, perhaps five hundred in all.

Besides receiving the cards, the men who were used to break strikes were guaranteed a "bonus" of at least a dollar a day in addition to the wages paid by the individual employer in whose shop they worked. This bonus was paid from the reserve fund of the Association as a "strike benefit" in recognition of the great inconvenience, social ostracism and perhaps even personal danger to which every strike breaker is known to be more or less liable. Loam molders in Cleveland received a bonus of four dollars and it is probable that some men earned seven dollars and more a day at that time.³

The cost of this card and bonus system was thought to be on the whole less than that of any other method of combating labor troubles. In the Cleveland strike, which lasted seven and a half months, and required the importation of six hundred and ten men who worked one day or more, the total cost to the Association was \$142,604.52, divided as follows:

Administrative council	\$2,899.37
Office expense	5,649.51
Procuring molders	7,153.42
Delivering molders	6,199.39
Compensation to foundries	31,175.25
Bonus to molders	79,705.53
Detective service	4,476.98
Miscellaneous expense	793.65
Expense of riot, September 29, 1900	854.04
Legal services	415.00
Expense of boarding men out	3,282.38

¹ Report of the Secretary, N.F.A., May, 1901 (ms.), p. 13.

² Proceedings, N.F.A., Detroit, November 19, 1902 (ms.), p. 20.

³ Report of the Secretary, N.F.A., November, 1900 (ms.).

The cost of procuring and delivering molders alone was \$21.89 per molder.¹ In subsequent struggles this item was materially reduced because of the systematic use of card indexes and other devices for keeping in touch with the men once found, which made getting strike breakers at another time an easier matter than had been the assembling of the group in the first place. Thus, the total expense to the Association of the Chicago strike of 1901-1902, which lasted thirteen months was only \$47,582.33. Here, four hundred and forty men who worked one day or more were supplied at an average cost of only \$6.28 per man, the total saving per man per day worked being 117 per cent of the cost of the same item in Cleveland the year before.² In 1903 the total cost of supporting twenty-three members whose eight hundred and fifty-three men had gone out was only \$46,238.91.³

This method of fighting strikes was fairly satisfactory so long as it was expected the strike breakers would be used only as a temporary lever to bring to terms Union members who would eventually be taken back. But there were several circumstances in connection with the use of the cards which made them open to abuse, and moreover, the system left the members of the Association as dependent as ever upon the Iron Molders' Union for the maintenance of a trained and permanent labor force. This situation was recognized as early as 1901.⁴ But it was not until the break with the Union several years later, and the establishment of a non-union policy, that it became positively necessary to provide for a member having trouble with his molders a crew of

¹ Report of the Secretary, N.F.A., May, 1901 (ms.), pp. 7-9.

² Proceedings, N.F.A., Detroit, November 19, 1902 (ms.), p. 15.

³ Ibid., Washington, November 11, 1903, p. 12.

⁴ Report of the President, N.F.A., November, 1901 (ms.), p. 14.

independent men who would permanently operate his foundry. To attain this end there are now employed under yearly contract a number of mechanics skilled in the trade of molding and coremaking who are placed in the shops of members in periods of labor troubles to act as instructors in breaking in and training new sets of men. These operatives are in no sense strike breakers, for from the moment the union men go out, the Union is completely ignored and the Association is concerned not with breaking the strike but with making the most of the opportunity afforded by the walkout to start up again on an independent and non-union basis. As rapidly as the shop assumes normal conditions, the contract molders are turned back to the Association and transferred elsewhere. By the terms of their contract, they are to go wherever they are sent, their railroad fare is paid and they lose no time because of the traveling.

All men employed through the Association to assist one of its members in making his foundry independent of the Union are engaged either under this yearly contract or under one which is very similar to it but is to run only sixty days. They are guaranteed wages varying from four to five dollars a day for day work, depending upon skill. In some cases the men arrange with the firms to which they are assigned, to work piece or premium plan, and earn in this way sums considerably in excess of the guaranteed day rate. It is said that the labor bureaus run by the Association have been in operation so long, and that the Association is so well and favorably known among the independent molders and coremakers of the country because of its fair dealings, that the bureaus are constantly in touch with men seeking work and can readily supply from time to time whatever labor is needed by the members. The

number of men under yearly contract varies with the industrial conditions prevailing. Their contracts expire at different times of the year and adjustment of supply to demand is therefore easy. When labor troubles have been few, not many will be thus engaged, but the sixty-day-agreement men supplement the others so nicely that practically any foundry can be adequately manned on twenty-four hours' notice.

When a member's support is to consist of the establishment of a new labor force in his foundry, the Association men are shipped to him and turned over to his control. Men who are to be trained are engaged, being often persons previously employed as laborers and at unskilled work in the shop. Machines are installed, specialized jobs are planned, piece work and other schemes for encouraging men to large output are introduced, and in a short time the foundry is in full operation with a new lot of men, improved appliances, and freedom from union rules and regulations.

Occasionally a condition may arise where it becomes necessary or desirable for one member to lend some of his men to another who is involved in a strike. This was sometimes done in the days before the present large supply of non-union men had been made available, but the commissioner reports that it is a practice to which recourse is now seldom had. Other methods of defense provided for in the by-laws are also used but little, altho they may at times supplement the customary method. To send struck work out to be made has been found very likely to bring on sympathetic strikes in the foundries to which it goes. To pay compensation for idle floors is readily seen to be only a last resort. Compared with the system of breaking in a crew of non-union molders for permanent employment, these latter plans present mere palliatives, for until a body of inde-

pendent men has been assembled and trained in any foundry, an employer is as much at the mercy of the Union as ever and has not succeeded in ridding himself of the causes which were usually instrumental in bringing on the trouble in the first place.

For administrative purposes the Association is divided into districts on geographical lines. In each district is a district committee of five members elected by the Association from names suggested by the members in the district, and an attempt is made to make these as representative as possible of the various localities and foundry interests. Each district committee chooses its own chairman and vice-chairman, who constitute with the president, vice-president and treasurer of the Association (unless as at present the last named is a banking institution) an administrative council. For all practical purposes, as regards formulation and carrying out of policy, this body is supreme, except that the constitution can be changed only by favorable action of two-thirds of the members; and such other matters as make an expression of opinion from all desirable are referred to their consideration.

From the very nature of the organization, the main function of the administrative council has been the settlement and prevention of labor difficulties. At first, the president and the district committees endeavored to adjust the constantly arising disputes without the services of any single person whose entire attention could be devoted to this work. Every time a member had a grievance with his employees, no matter how trivial, which the two parties could not settle among themselves, word was sent to the proper district committee. This had to meet within three days at the foundry of the complaining member, decide on the

merits of his controversy, and if it appeared he was in the right, arrange for such support as they were willing to allow in case the Union pressed the issue. It was also found necessary to convene the entire council in a number of sessions a year. Thus the time and effort required for Association affairs on the part of busy men was so great as to involve serious neglect of their own interests. Few could afford to take responsible offices, and those who did serve felt obliged to limit their terms to one year. The membership of the administrative council and district committees was therefore constantly changing.

In an effort to make the burden of leadership less heavy, the salaried office of commissioner was created in 1901, for the purpose of giving one man charge of the details of settling labor troubles and carrying on the executive work of the Association. This has greatly relieved the district committees as well as the president, for they are not called in now until all preliminary investigations have been made by the commissioner. When he believes a strike cannot be averted, the committee meet to decide whether or not they will grant support. In 1906, the president was allowed a salary for such a part of his time as the growing administrative work of the Association required. The result of these changes has been a greater permanence in the offices and a higher degree of efficiency all around. An adequate office and field force of experts, with headquarters in Chicago, New York, and Buffalo, handle the work of the Association. It has become an exceedingly effective business machine, altho much of the personal interest and relationship which prevailed when the group was smaller has necessarily been lost.

In order to obtain the Association's support in time of strike, a definite procedure is rigorously exacted of all

members. Experience has proven that anything short of this is sure to involve endless misunderstandings and other complications of a more serious nature. Before the defense work was thoroly systematized, there were many disagreements as to the amount of compensation and the circumstances under which it would be paid. Members took action and contracted expenses without authority from officers, council or district committees, and expected the Association to get them out of whatever further difficulties this involved them in with their molders, and to reimburse them for all expenditures. When this was refused, hard feeling, resignations and lawsuits followed. In 1904, in the general reorganization of the Association's affairs, the protective system was put on its present well-defined basis, and it was distinctly understood that thereafter all claims would be thrown out entirely if procedure had not been according to the letter of the by-laws.

A member having trouble with his men is required to notify the commissioner at once, in writing, giving the full details of the case. An immediate investigation is then made and if possible, the breach is patched up. This failing, the district committee is called together to determine whether or not the aggrieved member's cause is just, and the findings are reported to the administrative council, with whom rests the final decision as to the granting of support, its nature and amount. By asking the Association's aid, the member places the matter entirely in its hands and binds himself to carry out any decree of the council or of those acting under its authority, and pending the decision, he can make no settlement nor discharge his men without the consent of the council. In case support is granted, it may be in any one or more of the three ways already mentioned, provided that the supplying of men or the making of work

in another shop shall not be undertaken without the consent of the member. It is further understood, and now included in the by-laws, that in procuring molders, having the work done, or giving a money compensation to the amount of two dollars per man per day, this shall be only to the extent of seventy per cent of the men usually employed or the work produced as evidenced by the last quarterly report.

The method of defense having been decided upon, an *agreement for support* is entered into between the member and the Association in which the latter undertakes to assist and support the member for a reasonable period, this to be determined by the administrative council, who may reduce it from time to time or discontinue it entirely. The member in return agrees that the aid given is to be considered as the complete satisfaction of all claims on the Association because or on account of the prevailing strike, agrees not to make any terms with the strikers or their union representatives without the written consent of the council, agrees to provide at all times adequate police protection for the men furnished, and to absolve the Association from all responsibility for any industrial accidents which may occur. Finally, the member agrees that for a period of one year following the satisfactory adjustment of the trouble, he will conduct his foundry strictly on the "open shop" plan.

The support of the Association is by no means given every time it is requested, and in no case is a member entitled to aid until he has been in the organization at least two months. The council in its discretion may refuse help where the member has failed to advise the commissioner promptly of the existence and nature of the trouble, or when he has declined to comply with the advice of the president or commissioner. But having acted in accord with the Association's rules in all

respects, a member can expect to be supported in any attempt to enforce those principles for which it stands, as enumerated in the *outline of policy*. In other matters, the granting of aid will depend upon the issue involved and the justice of the member's position.

For the year ending November 1, 1913, the support of the Association was granted in thirty-two shops. As understood and classified by the Association, the issues involved were: —

Refusal to work with non-union men.....	2
Attempt to organize and force closed union shops.....	11
Control of molding machines.....	1
Elimination of differential wage rate.....	1
Refusal to discharge certain men for non-payment of special assessments levied by the Union.....	1
Demand for strictly closed union shop.....	3
Demand for closed union shop and reinstatement of men discharged for cause.....	1
Demand for minimum wage and closed union shop conditions.....	8
Apprentice ratio.....	1
Objection to employment of handymen.....	1
No demands; pickets from other shops on strike intimidated workmen until they refused to work.....	1
Objection to piece work and refusal to work with non-union men.....	1

It is obvious, of course, that the cause assigned by the employer in any dispute may be quite different from that mentioned by the men, and that often these causes are so interrelated as to make a singling out of any one utterly impossible. But from the above tabulation it appears that, at any rate in the employers' view, the maintenance of Association principles against the attack of the Union is the fundamental reason for the conflicts in support of which the Association lends its aid. Even if other factors are taken into account, the causes assigned by the Association must be considered to be the ones it believes the most important.

The Association by-laws have always required that during the existence of a boycott against the goods made by any member, none of the men originating the boycott should be countenanced until the boycott was removed. In recent years, since the anti-injunction propaganda of the unions has become so important, the administrative council of the Association has voted in individual cases to support members in their fights to have injunctions against the boycott and other union practices sustained.

From the formation of the Association, the attitude of a foundryman toward trade unionism has in no way affected his admission to membership. He can recognize the Union or not, as he pleases. For altho the Association as a body is definitely committed to the open shop policy, there is no requirement that each member shall run an open or non-union shop, nor, indeed, is a member obliged to conform to the *outline of policy* in all respects. If certain circumstances make it appear to an employer that he will be advantaged by signing an agreement with the Union, he is entirely free to do so. The one exception is that already noted: after having put his foundry on an open shop basis through the aid of the Association when he was having difficulties with the Union, he must retain this condition for at least a year. During the period of the agreement with the Iron Molders' Union, about 90 per cent of the Association's shops making heavy machinery were union and 80 per cent of the agricultural and malleable shops were open.¹ At the present time, 85 per cent of the members run open shops.²

¹ Proceedings, Conference, Detroit, November 9, 1899 (ms.), pp. 12, 13; Proceedings, N.F.A., New York, November 13, 1901 (ms.), p. 85.

² Hearings before the United States Commission on Industrial Relations, Washington, April 7, 1914, (ms.), vol. 1, pp. 242-243, 245, 246, 248, 251.

Membership in the National Founders' Association is limited to "persons, firms, or corporations engaged as principles in and operators of foundries where castings in iron, steel, brass or other metals are made." There was a tacit understanding at the beginning that no foundryman would be admitted who was eligible for the Stove Founders' National Defense Association; and in practice, members who made castings in any respect similar to those made by members of the latter organization were supposed to be guided in their procedure with their molders as far as possible by the Stove Founders' agreements. In the last few years, however, due to a growing dissimilarity of policy of the two associations, this practice has not been observed, and a number of stove manufacturers who find their attitude toward labor unions more adequately expressed in the National Founders' Association than in the Stove Founders' have been admitted to the former.

In 1900, the first classification of members was made on the basis of work produced in their shops.¹ The results were as follows:

Agricultural	24
Architectural	9
Brass and Bronze	4
Engines — Electrical, Mining, and New Machinery	77
Furnaces and Heating	10
General Foundry Work	143
Light Grey Iron	33
Machine Tools, etc.	8
Malleable	29
Pumps, Valves, Hydrants, Pipe	18
Steel	10

By comparing the total thus represented (three hundred and sixty-five) with the membership of the Association (two hundred and seventy-five) at the time, it is

¹ Proceedings, N.F.A., Detroit, February 1, 1900, p. 29; N.F.A., Confidential Circular No. 26; N.F.A. Handbook, May, 1900.

evident, that a number of firms were making two or more kinds of castings. At present, a page selected at random in the published directory of members, shows one making "structural, engine, and railroad castings; sash weights; castings for brick and butter tub machinery; general work," another "general jobbing; automobile and grey iron castings," still another "air compressors; steam pumps; duplex engine governors," which list might be continued indefinitely.

During the first few years, tremendous efforts were made to increase the membership of the Association. No method of selection was used and bad risks frequently were taken. Not only did some employers who were notorious for always having strikes in their shops gain admission and demand protection, but members refused to pay their assessments, refused to obey the rulings of the council, and in other ways caused the Association much trouble and expense. There was, of course, a natural tendency for concerns not to value membership very highly until they were threatened with an insurrection of their employees, and they would then seek protection in the Association often only to resign when the difficulty was settled. The membership was far from stable, and in some years more resigned than were admitted.

For a time the law of the Association provided that "no person, firm or corporation shall be elected to membership who shall be engaged in a strike," but in practice, this rule was frequently waived and employers whose molders had actually walked out were admitted and gained protection. In many cases, by pursuing the policy of defending such a firm, a further extension of the trouble was prevented and the welfare of the Association was better conserved than would have been the case had the struck shop been denied help and been

forced to yield to the Union's demands, since such concessions would inevitably have spread to other foundries in the same locality. The by-laws were therefore changed to conform to practice, and a "probationary membership" was created to take care of those foundrymen who wished to join during a strike. The administrative council may, after investigation and careful consideration, by a two-thirds vote advance a probationer to full membership if it seems to be to the interest of the Association to do so. While on probation, the member pays all the fees and assessments of a regular member but receives no financial benefit. Members are not allowed to resign while they are in the midst of a strike or pending the settlement of a dispute, unless by special consent of the council; and in any event, four weeks' notice must be given and all obligations to the Association be paid in full. A member who has resigned may be reinstated by the council upon payment of a sum equal to all the assessments he would have paid had his membership continued without interruption.

In the last ten years great care has been exercised in the selection of members, for it has been clearly demonstrated that the Association's strength does not lie in numbers alone. In an effort to include only the best firms in the industry, every application for membership is carefully investigated before it goes to the administrative council. A personal visit to the foundry is made by one of the officers and the firm's financial standing and general reputation is looked into. It is the intention to keep out such concerns as will be a constant source of expense or may in other ways prove undesirable. If the preliminary investigation shows the firm to be running an up-to-date plant, treating its employees in an honorable manner, and having an adequate financial

backing, its name is approved by a two-thirds' vote of the administrative council and is then sent to every member to be voted on. Unless ten protests to admission are received, election is complete. Objections raised by other members in the district where the applicant is located may occasionally keep a foundryman out, but for the most part the procedure is purely routine.

Altho members of the National Founders' Association employ about one-eighth of all the molders and coremakers in the country,¹ their importance in the industry is probably considerably greater than this would seem to indicate, because labor-saving devices not often used in other foundries have made possible in Association shops the employment of fewer men in proportion to the value of the output than is the general average. The foundries vary in size from small jobbing shops employing only half a dozen molders to the huge establishments of some of the best-known manufacturers of heavy machinery and other cast iron specialties. No firm is admitted which is capitalized for less than \$50,000 and the entire membership may at times represent a total capital of half a billion.² This means, in general, that they are the most progressive and most efficiently managed plants in the country. The aim of the Association is to keep them such, for in developing its program for the maintenance of industrial peace it has well understood how important a part is played by fair conditions of work and a body of contented men.

¹ Cf. Thirteenth Census of the United States, vol. iv, Table VI. The fact that the Association's membership contains a few Canadian foundries makes an exact comparison impossible.

² The president stated in 1904 that he represented 600 members with a capitalization of \$400,000,000, employing 60,000 men (*The Review*, March, 1904, p. 6); and in 1906, 525 members were credited with \$500,000,000 capitalisation (*ibid.*, March, 1906, p. 13). As the estimated number of members and operatives is considerably in excess of the number as reported by the secretary for these periods, it is entirely possible that the statement as to capital represented is somewhat liable to correction.

The number of members, the number of foundries represented, and the number of molders, coremakers, and apprentices employed is given in the following table:¹

Year	Number of Members	Number of Foundries	Number of Operatives
1898.....	66	...	...
1899.....	94	...	5,500
1900.....	369	...	16,646
1901.....	377	...	...
1902.....	494	527	27,389
1903.....	536	579	...
1904.....	456	...	...
1905.....	456	500	23,359
1906.....	475	531	...
1907.....	421	474	22,295
1908.....	419	467	14,373
1909.....	408	467	18,585
1910.....	426	492	22,039
1911.....	454	489	20,142
1912.....	484	520	23,593
1913.....	500	536	25,930
1914.....	484	514	21,598

Up to the end of 1903, the membership grew rapidly, but since then the growth has not been maintained. The causes of the change are several. The modification of policy as to mere numbers has already been noted. Between 1898 and 1903, there was probably not an employer of molders in the United States or Canada who did not have urged upon him at meetings, or through letters or personal interviews, the benefit of membership. Then too, the years from 1899 to 1903 saw a boom in the foundry industry such as it has not since experienced. This meant a greater growth of the

¹ The difference between number of members and number of foundries is due to the fact that some of the concerns operate several shops in different parts of the country. Since 1907, membership has been counted by separate foundries rather than firms, but the secretary has estimated the number of the latter these foundries represent. Figures are for June, 1898; February, 1899; the average of the last quarter for 1900; and for the succeeding years, for the time of the annual meeting in November. Number of operatives given for 1899 is approximate. The secretary reported 94 firms with an average of 59 employees each. (Proceedings, N.F.A., Buffalo, February 1, 1899.)

Iron Molders' Union and more aggressive activities than have occurred at any similar period in the Association's history. Thus there was a very special reason for many foundrymen to seek protection from the demands of their men. Some of the heavy increase in 1899 and 1900 must certainly be attributed to the signing of the agreement with the Union, about the efficacy of which as a preventive of strikes all were very optimistic. After 1903, the attitude of the Association began to change, and many members resigned, some on that account, and some because the industrial boom was waning. Between November 1903 and April 1904, sixty-five resignations were received while only twenty-one members joined; between April and August thirty-three resigned and seven were added; between August and November thirteen resigned and two were added. The reasons given for these withdrawals were that the Association was of no assistance to the members because of their isolation, failure in business, expense, disagreement with the Association's policy.¹

No loss whatever occurred because of the complete change of procedure in 1904, altho there was considerable fear that this result would follow the abrogating of the agreement. Some change in the personnel took place, of course, but resignations were fully counter-balanced by the acquisition of foundrymen who had previously refrained from allying themselves with an organization which they felt tended to foster in their shops what they believed to be the uneconomic and unfair practices of unionism, and to that extent handicapped them as against some of their competitors. Such fluctuations as have taken place since 1903 may be explained almost entirely by referring to industrial

¹ Proceedings, N.F.A., Cincinnati, November 16, 1904, in *The Review*, December, 1904, p. 9.

conditions and the state of the labor market. When times are good and molders in demand, membership increases. When the contrary is true the Association is not so large. There has been nothing of late years in the way of generally prevalent labor troubles to force employers into the Association. It was reported at the annual meeting in November 1914, that protection had been required for only five members during the preceding year; in 1913 there were thirty-two strikes and the membership was somewhat greater than in 1914; in 1912, twenty-one shops were protected.¹ Of the foundrymen who stay out of the Association, some consider it too radical, others are satisfied to allow it to provide conditions making for an industrial peace in which they share but with the expense of which they are unwilling to be burdened, and still others have always succeeded in maintaining such harmonious relations with their men that they feel no need of help from the Association.

It has been suggested that the weakening of local influence which resulted when the district committees ceased to come intimately in touch with individual affairs might be mitigated by the formation of local bodies of foundrymen coming together in the national Association, but this has never proved feasible. There are already local organizations of foundrymen in a few of the large centers, to which members of the National Founders' Association in some cases belong, but as a rule the local groups have been so heterogeneous in their constitutency as to make an effective method of control impossible, and except for occasional coöperation in the handling of a particular local matter, there has never been any connection between the two.

¹ *Iron Trade Review*, November 26, 1914, p. 1004; *Proceedings, N.F.A.*, New York, November 19, 1913, p. 17; *ibid.*, New York, November 20, 1912, p. 29.

An annual meeting of the Association is held in November at which officers and district committees are elected. It is a well-established practice that the vice-chairmen of the latter shall succeed the next year to the chairmanship. Votes have always been allowed on all subjects in proportion to the assessments paid. At present each member has one vote, and those members whose assessments exceed one hundred dollars a year are entitled to one additional vote for every one hundred dollars so paid. In the formative years much of the time of the convention was necessarily devoted to discussions of policy, government and administrative details. But the constitution and by-laws as well as the policy which crystallized in 1904 have proven so satisfactory as to have occasioned no subsequent concern. Except for the necessary routine business, the annual meetings are devoted to consideration of the larger aspects of the labor problem, such as legislation, both state and federal, safety and sanitation work, industrial education, and the like. At many of the meetings there is no mention whatever of trade unions. Even the administrative council now meets only at the time of the annual convention, since there is no constitutional rule regarding this beyond the provision that the president shall convene it in his discretion or on the written request of four members. Special meetings of the entire Association may be called when there are grave conditions threatening its welfare, but only three have ever been held, the last at the time of the great molders' strike in 1906. When such emergency meetings are held, any decision there reached becomes binding on all members.

Foundrymen on joining the Association agree "1st, In consideration of fair dealing being a cardinal principle of this Association, to protect any of our fellow members

who may require our support against any unjust demands of labor organizations and to endeavor to settle all disputes amicably. 2nd, To obey the constitution and by-laws and all rules made in conformity with the same, provided they do not conflict with the laws of the country, state or province in which we do business."

No bond is required that this pledge will be kept and at first the disciplinary machinery was so defective that members could disregard their obligations with impunity. A particularly bad breach of faith on the part of some members in 1901 led to the strengthening of the hands of the officers so as to give power of investigation and suspension for cause, and this has been used in a few cases where the member concerned settled with the Union after agreeing to leave his dispute entirely in the hands of the administrative council. It never was used to force members to live up to the agreement with the Union, altho there were a number of cases of violation in which support was denied.

Especially difficult have been the cases in which members have refused to meet their financial obligations. The by-laws require that if assessments are not paid as they become due, that is within thirty days after proper notification, a draft shall be drawn against the delinquent. If he fails to honor this, his membership in the Association ceases automatically except that the council may reinstate him upon his showing cause for non-payment and meeting all past indebtedness. On the other hand, members are not expected to leave with dues to the Association unpaid. If sight drafts and collectors fail to secure payment, a lawsuit may result. The decision in an interesting litigation in Ohio in 1904 established the legal status of employers' associations and their right to control their members. It was held that being formed for the purpose of mutual protection,

the Association could not only sue and recover for dues and assessments, but also that the application for membership and the acceptance thereof constituted a valid contract and that thereafter the member was bound by the constitution and by-laws.¹

The initial financial system left much to be desired both as to income and expenditure. The annual dues of fifty dollars went into a general fund, available for current expenses, and in addition, all members on joining paid into the reserve fund such a sum in proportion to the unexpended balance of the fund as the number of molders they employed bore to the total number of molders employed by all members. Each member paid to the reserve fund ten cents a month for every molder employed, molders' and coremakers' apprentices and unskilled coremakers counting two as one molder. The basis of these assessments was the average maximum number of molders employed in each month of the preceding quarter as reported to the secretary.

But these sums were not sufficient to carry on the work of the Association and special assessments of one dollar a molder were levied, sometimes one, two or more a year. This meant for many members a great expense, not always commensurate with the benefit they were receiving. One of the largest concerns in the organization paid in one year \$600 in regular assessments, and between \$3,000 and \$4,000 in special assessments. In 1900, the contribution which a firm joining would have to make to the reserve fund averaged a little more than \$11 per molder, and the total amount paid was in some cases \$600 and \$700.² This heavy expense brought a number of resignations. Other members believed that the burden was not fairly distributed, in that there was

¹ National Founders' Association v. Taplin Rice and Company, Court of Common Pleas, Akron, Ohio, 1904. See *The Review*, January, 1905, pp. 13-16.

² Proceedings, N.F.A., New York, November 13, 1901 (ms.), pp. 67, 83.

no gradation of assessment on the basis of the molders' skill, altho it was well-known that loam or machinery molders were infinitely harder to replace than squeezer men or machine operators. In 1902 a change was made to take account of this, and again in 1904, so that at the present time the assessments are as follows: for journeymen floor molders, forty cents per man per month; for journeymen bench molders and journeymen coremakers, thirty cents per man per month; for molders' apprentices, specialty molders not skilled in the general trade of molding, molding machine operators, unskilled coremakers and coremakers' apprentices, twenty cents per man per month; but in no case may the dues amount to less than fifteen dollars per quarter.

The only foundry employees upon whom Association members pay assessments and against whose strikes protection is supplied are molders of varying degrees of skill and coremakers. In 1906, when the Brotherhood of Foundry Employees, a union of cupola tenders, helpers, gangway men and the like seemed to be growing in power and importance, the officers of the Association considered the advisability of including them as assessable operatives, with consequent protection to members in case of trouble from that source. But no steps have been taken to bring about this added service, due no doubt to the fact that such unskilled help is replaced so easily that individual employers can fill without difficulty any vacancy caused by their striking and no need has been felt for the Association to assume this responsibility.

Data regarding assessable operatives have been furnished by the secretary of the Association from the reports of members for the last quarter of selected years.¹

¹ The figures given here differ somewhat from those presented on p. 375, due to the fact that the latter, except for 1900 are as reported at the annual meeting in November and are for the third rather than the last quarter.

	1900	1902	1905	1910	1913
Floor molders, skilled . . . . .	...	10,527	8,900	6,404	7,430
Bench molders, skilled . . . . .	...	4,220	3,063	2,586	2,800
Floor and bench molders	10,034	...	...	...	...
Specialty molders . . . . .	...	...	1,807	2,489	3,060
Specialty molders and machine operators . . . . .	...	4,067	...	...	...
Specialty molders and apprentices	1,959	...	...	...	...
Molding machine operators	1,248	...	2,716	3,219	4,502
Molders' apprentices . . . . .	...	...	2,432	1,861	1,968
Molders' apprentices, unskilled coremakers and apprentices . . . . .	...	5,837	...	...	...
Coremakers, journeymen	1,907	2,738	2,217	2,268	2,660
Coremakers, unskilled . . . . .	...	...	1,357	1,445	1,913
Coremakers' apprentices . . . . .	...	...	867	862	887
Coremakers, specialty and apprentices	1,498	...	...	...	...
Total	16,646	27,389	22,359	21,134	25,220

The annual dues of fifty dollars have been abolished, but the original provision for contribution to the reserve fund on joining has been retained and supplemented by a further provision that the council may in its discretion collect an even greater sum. The aim has always been to build up a reserve or defense fund of sufficient size to provide for emergencies, which should at the same time serve as a preventive of as well as a protection against the excessive demands of a too confident union. The enormous defense fund of the Stove Founders' National Defense Association, which has not had a strike of its molders in twenty-five years, has seemed a feature desirable to copy. For a time it was quite impossible to accumulate very much in the reserve, but in 1903, due to the growing conviction that the financial basis was not entirely sound, a number of changes were made which laid the foundation for the present system. Since then, a reserve fund of some size has been continuously

maintained. All assessments now go into the general fund; from this appropriations to the reserve are made from time to time by the administrative council, in whose care all financial matters have been placed. Special assessments are levied occasionally for the purpose of increasing the reserve fund and thus equalizing the cost of labor troubles over a period of years, and they have also been asked to meet the requirements of an unusually expensive strike.

No financial statement is published. Any estimate of the Association's income based on the data previously presented as to the number of operatives upon whom assessments are paid is of little value, because of the unknown but fairly frequent special assessments. In a sense, the financial resources are unlimited, for no difficulty is experienced in collecting funds when real danger threatens, and it is the policy to ask for extra contributions at such times instead of drawing on the reserve fund. No one resigning or expelled is entitled to a refund on what he has paid in, unless he is retiring from business, in which case he receives such a proportion of the reserve as his percentage of contribution to the average of the last two assessments bears to the balance of the fund unappropriated.

The defense work of the National Founders' Association thus far described has been that which aids members who have come into actual conflict with the Iron Molders' Union. Another part of its activity is concerned directly with the prevention of strikes. The undertakings which have been engaged in for the purpose primarily of avoiding labor difficulties and building up a strong body of non-union molders should be briefly mentioned. After a most unsatisfactory trial of private detective agencies the Association has taken over its

own secret service work in a department organized expressly to receive information from special representatives, union and independent, in the shops of its members. These confidential correspondents keep the Association informed as to conditions in the foundries, report incipient trouble and proposed outbreaks of the Union together with suggestions as to how they may be averted, and help in running down union thugs, wrecking gangs, and operations of a lawless nature designed to harm Association plants and non-union laborers. At no time was the inherent usefulness of this branch of the Association's work better demonstrated than in 1906, when through its channels information was received as to the demands which were to be made by the Union on May 1. The Association, being unwilling to meet them, had ample time to prepare for the general strike which followed. Organized safety and sanitation work has been recently undertaken, partly to meet the new workmen's compensation laws and partly as another means of keeping the men contented by giving them better places in which to work, thereby decreasing the likelihood of strikes. The encouragement of friendly relations between employer and foremen, that the latter may side with the firm rather than with the Union in case of trouble, of proper training for apprentices, of the installation of molding machines, specialization, etc., so as to avoid the worst features of cessations, the insistence upon fair conditions generally, are all a part of the Association's defense system that seems to have borne fruit in the increasing size and representativeness of the body of non-union men who are loyal to the Association and can be depended upon whenever the Union undertakes to cross the path of their employers.

Inability to reach their men in such a way as to put before them fairly the principles for which the Associa-

tion stands and the larger aspects of the labor problem generally, was early recognized as a serious handicap to the establishment of the desired relations between employer and employees, and in 1904 an attempt was made systematically to counteract the teachings of unionism on these points by publishing and distributing to the molders of the country such printed material as would correctly state the Association's position, what were believed to be the fallacies of the trade union arguments, and the program of equitable dealing under which the Association aims to operate its shops. The leaflets of this original experiment have expanded into a creditable monthly journal known as *The Review*, which is published jointly with the National Metal Trades Association, and which has a mailing list of 12,000 names. Its purpose is to provide gratuitously, reading material dealing with trade and industrial questions for the metal workers of the country who otherwise have to depend upon what is thought to be the one-sided interpretation presented in the *Iron Molders' Journal* and similar organs. In *The Review* of course, emphasis is laid on the justice of the Association's position in the matter of industrial relations.

With the perfecting of the defense system as outlined, the Association has been free to devote itself to other phases of the problem which is its chief interest. It has cooperated with those organizations whose purpose is to repress the enactment of laws which make for the benefit of union men as against non-union men and the manufacturers. To this end, it has joined with the National Association of Manufacturers, the National Council for Industrial Defense, and the Anti-Boycott Association in fighting anti-injunction laws, laws designed to limit employment in various ways, as certain regulations of hours, certain types of workmen's com-

pensation laws, minimum wage laws, and the like. The National Founders' Association has itself at times retained a representative in Washington to watch proposed legislation of possible interest to the Association and to direct attempts to quash such as is undesirable. On the other hand, the Association has given hearty support to those laws which it believes fair and proper. One of the first men who studied the workmen's compensation question was appointed to do so by the National Founders' Association and was afterwards sent to Europe for the same purpose by the state of Minnesota. The Association's safety and sanitation expert has helped to draft a number of state compensation laws, that of Indiana being the Association's model law almost *in toto*. The Foundry Code recently adopted by New York state was drawn up by a board of employers all but one of whom were members of the National Founders' Association.

Enough has been said to show that the National Founders' Association, altho a voluntary organization formed to deal collectively with the employees of its members, is as much of a business as is the conduct of the private enterprises of any one of its constituency. Its creed is said to be based on the assumption that its members and their men are living in a free country and that their constitutionally guaranteed freedom to contract must not be interfered with by private or public forces. It directs its strength against those agencies which are thought to hold a contrary view and has organized its own activities so as best to meet the opposition and advance its own welfare. But tho all business is selfish in essence, and tho the National Founders' Association is putting into operation those undertakings which make for its own protection, yet it provides at the same time safe and sanitary places in which to work,

hours no longer than the going schedule, and wages often in excess of the union rate. While objection may be raised to the paternalism this program involves, the Association has always justified it on the ground that in protecting the independent molders of the country against union monopoly, it is performing a real service for those men who wish to be unrestricted but who without support from their employers would never be able to throw off the union control which they find irksome. The present paper does not aim to decide which condition is the more desirable.

MARGARET LOOMIS STECKER.

MOUNT HOLYOKE COLLEGE,
SOUTH HADLEY, MASS.

THE AMALGAMATED COPPER COMPANY: A CLOSED CHAPTER IN CORPORATION FINANCE

SUMMARY

The original constituents of Amalgamated, 388. — Absorption of Boston & Montana and Butte & Boston, 389. — United Copper, 391. — Relations of United Metals, Utah Consolidated, and International Smelting and Refining Company, 392. — Purchase of properties by Anaconda, 395. — Expansion of International; its absorption and dissolution, 397. — Dissolution of Amalgamated, 402. — Conclusions, 406.

On June 7, 1915, by a unanimous vote of the shares represented at the meeting then held, the Amalgamated Copper Company voted to dissolve itself.¹ It had at that time existed for a little more than sixteen years, having been incorporated in New Jersey on April 27, 1899.² Its history and that of some of its subsidiaries form an interesting chapter in corporation finance and corporate organization. In tracing this history it will be necessary to leave a number of loose threads in the narration, which can be tied together only toward the close.

The advertisements which appeared in newspapers and financial journals at the end of April, 1899,³ inviting public subscriptions at par to the stock of the Amalgamated Copper Company, gave but a vague notion of the kind or amount of property the company held. They told of a \$75,000,000 corporation, formed to purchase and operate copper-producing properties, which

¹ Comm. and Fin. Chron., 100:2012.

² Weed, W. H., *The Copper Handbook*, XI:35.

³ As in Comm. and Fin. Chron., vol. 68, issue of April 29, 1899.

had already purchased "large interests" in the Anaconda Copper Mining Company, the Parrot Silver & Copper Company, the Washoe Copper Company, the Colorado Smelting & Mining Company (all operating at Butte, Montana), and "other companies and properties." The stock was oversubscribed. How much of its attractiveness was due to the announced presence on the directorate of Henry H. Rogers, William G. Rockefeller, James Stillman, and other men of importance in the financial world, it is of course impossible to say. Just a month later, Messrs. Rogers, William Rockefeller, William G. Rockefeller, and A. C. Burrage, all identified with Standard Oil, were elected directors of Anaconda;¹ which showed that, whether or not the Amalgamated Company owned a controlling interest in the great Butte mine, the Amalgamated group had control of it. As a matter of fact, President Ryan of the Amalgamated, in 1915 stated that the company had always held a majority of the stock of the Anaconda.² In 1899 the capitalization of the latter was \$30,000,000 in 1,200,000 shares.

In November, 1900, Amalgamated was admitted for trading purposes to the Unlisted Department of the New York Stock Exchange.³ Admission to this department (which no longer exists) entailed the submission of only meager reports to the officials of the Exchange. In such a report, made in 1900, we find it stated that the company owned all but organizers' shares of the Washoe Copper Company, the Colorado Smelting and Mining Company, the Diamond Coal & Coke Company, and the Big Blackfoot Milling Company (a lumber concern),

¹ *Comm. and Fin. Chron.*, 63:1022.

² *Ibid.*, 100:1504.

³ The report of the Committee on Unlisted Securities, of November 23, 1900, in which admission was granted to Amalgamated, is reproduced in full in Moody, *The Truth about the Trusts*, chapter 1.

a majority of the shares of the Anaconda, the Parrot, and the Hennessy Mercantile Company, and a large number of shares in the Boston & Montana Consolidated Copper and Silver Mining Company, of Butte.¹ The last-named, one of the Bigelow-Lewisohn² mines, was one of the richest copper mines in the world.

If now we assume that these holdings were, save for the Boston & Montana, approximately those that the company began with, and if we use the figures given on page 394; and if we assume further that in the case of these particular stocks the amounts owned had not changed in the intervening years, save for the reorganization of the Colorado Company as the Trenton Mining & Development Company, we get the following figures for the par values of the security assets of the Amalgamated (save for the shares in Boston & Montana):³

Company	No. Shares Owned	Par Value	Total Par
Anaconda.....	620,000	\$35	\$15,600,000
Parrot.....	115,299	10	1,152,990
Colorado.....	...	..	2,500,000
Waahco.....	30,459	100	3,045,900
Diamond.....	149,993	10	1,499,930
Big Blackfoot.....	6,395	100	639,500

Total par value of above stocks owned..... \$24,338,320

In April, 1901, Kidder, Peabody & Company, of Boston, announced that they had been asked to arrange a consolidation of the Boston & Montana and the Butte & Boston Consolidated Mining Company (another Butte company under Bigelow-Lewisohn control) with the Amalgamated.⁴ They said that they would receive

¹ Comm. and Fin. Chron., 71:1117. Moody, The Truth about the Trusts, p. 14.

² Albert S. Bigelow of Boston was associated with the Lewisohns of New York in a number of copper-mining operations in Michigan, Montana, Arizona, and Tennessee. Lewisohn Bros. was a firm of metal brokers in New York City.

³ Anaconda, the chief constituent of the combination, had paid dividends as follows since its organization in 1895: 1896, 7½%; 1897, 10%; 1898, 10%. In 1899 it paid 13%. Eng'g and Min'g Jour., 67:37; 69:39. The writer holds no brief for either of the assumptions in the text and must confess entire ignorance as to the real situation.

⁴ Comm. and Fin. Chron., 72:777.

deposits of the stocks of these two companies and that, in case fair terms of exchange could be arranged, depositors who were satisfied might receive Amalgamated shares in certain ratios, or \$375 a share for Boston & Montana and \$92.50 a share for Butte & Boston.¹ It is sufficient here to say that later, for each share of Boston & Montana (\$25 par), four shares of Amalgamated (\$100 par each) were given, and for each share of Butte & Boston (\$10 par), one share of Amalgamated.² Stockholders of Amalgamated voted to increase its capitalization by \$80,000,000, from \$75,000,000 to \$155,000,000, in order to absorb the two companies, whose combined capitalization was only \$5,750,000.³ The Amalgamated was soon possessed of practically all the shares of its two competitors, and had issued, all told, \$153,887,900 of its own stock.⁴

We find here a much greater absolute and relative inflation of capitalization than took place in 1899. Boston & Montana, however, it should be said at once, with a stock issue of only \$3,750,000, possessed not only a remarkably rich copper mine, but, thanks to large earnings that had been reinvested, a reduction plant at Great Falls, Montana, that included a first-class smelter and an electrolytic refinery. Its dividend record, further, was a good one. From 1888 to 1900 it paid forty-two dividends.⁵ In 1895, the rate was 28 per cent; in 1896, 40 per cent; in 1897, 48 per cent; in 1898, 64 per cent; in 1899, 144 per cent; in 1900, 172 per cent.⁶ Butte & Boston had been reorganized in

¹ The range of prices on the Boston Stock Market during the preceding month, March, 1901, was: Boston & Montana, 330-370; Butte & Boston, 85½-100; Amalgamated, 94¼-104¼. *Eng'g and Min'g Jour.*, 73:75.

² *Ibid.*, 72:1082.

³ *Ibid.*, 72:1239. Boston & Montana, \$3,750,000; Butte & Boston, \$2,000,000.

⁴ Either the Boston & Montana owned in 1900 had been disposed of, or stock was now issued against it. This is easily computed by comparing the shares of the two companies not owned (p. 394) with the par value of Amalgamated stock not issued.

⁵ *Ibid.*, 70:531.

⁶ *Ibid.*, 73:209.

1897,¹ after receivership proceedings; it was no such property as Boston & Montana, and had no such dividend record behind it. The market quotations of these stocks are of no real value in appraising the companies, since they were highly speculative issues in which violent movements took place. On the basis of earning capacity, there can be little doubt that Butte & Boston was taken in at too high a figure, Boston & Montana at none too conservative a figure.

In the following year, again in the latter part of April, the United Copper Company was incorporated in New Jersey, as a holding company.² Butte mining properties and others were acquired. Its president was F. Augustus Heinze, who, since the middle nineties, had been making trouble for the Boston & Montana, the Butte & Boston, the Parrot, and the Anaconda, by litigation for possession of mining veins in the Butte camp. Some of the companies which went to make up the United Company, owned or otherwise held mining claims in various sections of the camp, and were extracting ore that neighboring companies charged they had no right to, and were similarly charging their neighbors with unlawful extractions. There were at times one hundred or more suits and counter-suits pending, and the situation was almost intolerable. It changed only when in 1906 Heinze was bought out. The process consisted of the taking over of Heinze's Butte copper properties by a new company, the Butte Coalition Mining Company, formed and controlled by interests friendly to the Amalgamated.³ The Red Metal Mining Company was organ-

¹ Eng'g and Min'g Jour., 90:1551. In the fourteen years of its existence, from 1897 to 1911, its dividend record was as follows: 1900, 50%; 1901, 30%; 1904, 10%. (Eng'g and Min'g Jour., 71:42; 73:55; 79:70. Copper Handbook, X:495.)

² Eng'g and Min'g Jour., 74:942.

³ Ibid., 82:511. Stevens, The Copper Handbook, VIII:432. Moody's Manual, VII:2032. The president of the new company was Thomas F. Cole, who was associated in a number of copper-mining enterprises with John D. Ryan, then Managing Director of Amalgamated. Mr. Ryan was on the directorate of the Coalition.

ized at the same time, as the operating company for the properties transferred, and its shares were all held by the Butte Coalition. By means of this consummation, some eighty law suits between Amalgamated and Heinze interests were dismissed.¹

Now in January, 1900, there had been incorporated in New Jersey the United Metals Selling Company, with \$5,000,000 capital, to take over the business of the Lewisohn Bros. metal-selling agency.² The first directorate included, besides Leonard and Adolph Lewisohn, William Rockefeller and Henry H. Rogers. The company did not engage merely in selling metals, but acquired the stock of the Raritan Copper Works, a large copper refinery at Perth Amboy, N. J.³ It thus made itself an important factor in the production as well as in the sale of copper. Tho not an Amalgamated subsidiary, it was distinctly under the control of Amalgamated interests; and it refined some and sold all of the copper produced by Amalgamated subsidiaries and other allied or friendly concerns. It was a profitable affair, its dividend rate never being under 10 per cent a year, except in 1901, and in the later years of its existence 20 per cent or more.⁴

In 1903, there was formed the Utah Consolidated Mining Company, as a reorganization of an English company (the Utah Consolidated Gold Mines, Ltd.) which had been operating the Highland Boy copper mine at Bingham, Utah, not far from Salt Lake City.⁵ The president of the new company was Urban H. Broughton (son-in-law of Henry H. Rogers), who had been General Manager of the English company.⁶ The

¹ Comm. and Fin. Chron., 82:570.

² Ibid., 70:284.

³ Copper Handbook, VIII:1350.

⁴ Comm. and Fin. Chron., 83:1541; Copper Handbook, X:1728.

⁵ Ibid., VIII:1746.

⁶ Ibid., III:533, 534; VII:1374, 1375.

company smelted its own ores until in 1907 a court injunction caused the smelter to be closed down because of alleged damage to agricultural operations in the vicinity, from the smelter fumes.¹ The Garfield Smelting Company, a subsidiary of the American Smelters Securities Company, then made a contract with the Utah Consolidated for smelting its ores.² In 1908, however, the copper company entered into a contract with W. D. Thornton, of Butte, whereby the latter agreed to erect a smelter nearby, at Tooele, Utah, to treat Utah Consolidated ores at a more favorable rate than obtained under the Garfield contract, and to give the Utah Consolidated an option on any part of \$500,000 capital stock of the new smelting company that was to be formed.³ In December, 1908, the International Smelting and Refining Company was incorporated in New Jersey, to take over the contract and build a smelter to treat Utah Consolidated ores and others that might be offered for reduction.⁴ It issued \$10,000,000 stock.⁵ Its first directorate included Mr. Broughton, President of the Utah Consolidated and an officer of the United Metals Selling Company; Mr. Cole, President of the Butte Coalition; Mr. Ryan, Managing Director of Amalgamated; Adolph Lewisohn, President of United Metals; Thomas Morrison, Director of the United States Steel Corporation; C. F. Brooker, President of the American Brass Company; and others. Mr. Ryan was elected President.⁶ (About two months later, upon the decease of Henry H. Rogers, Mr. Ryan was chosen President of Amalgamated in his stead.) At the time that the directors were elected, the company purchased from the

¹ Comm. and Fin. Chron., 86:55.

² Ibid., 86:289.

³ Ibid., 87:1483.

⁴ Ibid., 87:1666.

⁵ Copper Handbook, X:986.

⁶ Comm. and Fin. Chron., 88:885, 886; 90:1552.

United Metals Selling Company all the capital stock of the Raritan Copper Works and certain ancillary companies.¹ It later organized the Tooele Valley Railway Company, to build a road to connect the plant with the San Pedro, Los Angeles and Salt Lake Railroad. The Utah Consolidated exercised its option and bought \$500,000 International stock.²

The next move of interest for our purpose came in January, 1910, when it was announced that shareholders of the Anaconda would vote on March 23 to authorize an increase in the stock of the company from \$30,000,000 to \$150,000,000, part of the new stock to be used to acquire other companies at Butte.³ This step was said to be for the purpose of obviating all possibilities of litigation under mining laws, such as had been carried on with the Heinze interests, and to open the way for the introduction of certain mining economies. Shortly after the announcement was made, the Amalgamated, in a statement to the New York Stock Exchange accompanying an application for regular listing on the Board, reported its security holdings as follows:⁴

Company	Shares Issued		Total Par Value	No. Shares Owned by Amalgamated
	Number	Par		
Anaconda.....	1,200,000	\$25	\$30,000,000	620,000
Boston & Montana.	150,000	25	3,750,000	147,915
Butte & Boston....	200,000	10	2,000,000	197,220
Parrot.....	229,850	10	2,298,500	115,299
Trenton.....	10,000	100	1,000,000	9,995
Washoe.....	30,464	100	3,046,400	30,459
Big Blackfoot.....	6,400	100	640,000	6,395
Diamond Coal.....	150,000	10	1,500,000	149,993
Mountain Trading.	1,110	100	110,000	1,107
Greene-Cannons*	2,500,000	20	50,000,000	100,000
Butte Coal'n.....	1,000,000	15	15,000,000	50,000

¹ Comm. and Fin. Chron., 90:1552.

² Ibid., 91:275.

³ Ibid., 90:305.

⁴ Comm. and Fin. Chron., 90:693.

⁵ A holding company for certain Mexican copper properties. Mr. Cole was president, and Mr. Ryan a director. Copper Handbook, X:894; VIII:746.

On March 23, the Anaconda shareholders authorized the proposed increase¹ and it was announced that 3,020,000 shares, of \$75,500,000 par value, would be issued in exchange for the properties of the following companies, in the amounts stated:

Company	Anaconda Stock to be Issued	
	No. of Shares	Total Par Value
Boston & Montana	1,200,000	\$30,000,000
Butte & Boston	300,000	7,500,000
Washoe Copper Co.	380,000	9,500,000
Trenton M. & D. Co.	120,000	3,000,000
Parrot Silver & Copper Co.	90,000	2,250,000
Big Blackfoot Lumber Co. ²	300,000	7,500,000
Diamond Coal & Coke Co.	100,000	2,500,000
Red Metal Mining Co.	500,000	12,500,000
Alice Gold & Silver Mining Co. ³	30,000	750,000

The situation therefore involved taking over those mining and smelting properties in and near Butte in which control by stock ownership was held by the Amalgamated and by Butte Coalition, as well as the companies which supplied timber and fuel to the Anaconda for its mining and smelting operations.

The most obvious thing about these two tables is that in the case of five of the exchanges a greater par value of stock was being issued than would be retired in the event of the dissolution of the companies purchased. In this list is hardly to be included the Washoe Copper Company, since in addition to its three million odd dollars of stock it had outstanding about \$8,000,000 of notes, in the hands of the Amalgamated, for money borrowed, part of it for construction work at its magnificent smelting plant at Anaconda, Montana.⁴ It should be said also that the Big Blackfoot Lumber Company had not the same small capitalization as the original Big

¹ Comm. and Fin. Chron., 90:851.

² Successor of the Big Blackfoot Milling Co. *Ibid.*, 90:1551.

³ A famous old Butte silver mine. The majority of its stock was held at this time by Butte Coalition. Copper Handbook, X:497.

⁴ Copper Handbook, X:1804.

Blackfoot Milling Company, but one of ^{25,000,000} \$2,500,000; it was, however, merely the successor of the Milling Company.¹

The next thing to be noted is that whereas Amalgamated, nine years previously, had issued \$60,000,000 of its stock for the stock of the Boston & Montana, and \$20,000,000 for that of the Butte & Boston, Anaconda was now offering for the properties of these two companies respectively \$30,000,000 and \$7,500,000 of its stock. To be sure, each of the companies had in the meanwhile produced considerable copper, silver, and gold, and had to that extent depleted its resources. It is true, further, on the one hand, that whereas in 1901 Butte & Boston had \$1,500,000 bonds outstanding,² these had now been retired, and on the other hand, that while in the earlier year the same company was at least temporarily on a dividend-paying basis, at the time now under consideration it had not paid a dividend in six years. Bearing on the situation also is the fact that at this time the market value of Anaconda was roughly \$50 a share,³ and that the exchange value of the securities it was turning over to the shareholders of the two companies was just about twice their par value. (This is of course no less significant in the consideration of the other exchanges made at the same time.) Finally, Amalgamated was almost the only shareholder in Boston & Montana and Butte & Boston; tho, to be sure, it was far from the only holder of Anaconda stock, and the equities of all the other owners were clearly affected by such a large increase of capitalization as was now to take place. Amalgamated absorbed most of the increase, so that whereas it had hitherto held only

¹ Comm. and Fin. Chron., 90:1551.

² Eng'g and Min'g Jour., 62:614; Copper Handbook, VIII:429; X:495.

³ Comm. and Fin. Chron., 90:288, 830.

a few thousand shares more than a majority, it was now to own over 3,000,000 out of a total issue of about 4,200,000 shares.

Its holdings were before long to increase further. Later in the same year, in May, 1910, it purchased from W. A. Clark certain of his properties in Butte, including a few mines, a smelter, and a realty company.¹ It gave Mr. Clark, in payment for these, its notes for \$5,000,000. It then turned the properties over to the Anaconda, receiving therefor 112,500 shares of the stock of the latter company. This transaction increased the capitalization of the Anaconda to \$108,312,500, in 4,332,500 shares.²

We come back now to the United Metals Selling Company and the International Smelting and Refining Company. When the Raritan Works were turned over by the United Metals to the International, 40,000 shares of stock of the latter as well as cash passed to the Selling Company.³ In March, 1911, the Amalgamated sold to the National City Bank and the Guaranty Trust Company of New York \$12,500,000 5 per cent notes, due April 1, 1913, most of the proceeds of which were to be used in absorbing the United Metals Selling Company.⁴ The Amalgamated later reported that for the 50,000 shares, of \$100 par, outstanding, it had offered net \$241 a share. All of the stock was in the end acquired.⁵ The official announcement said that the purchase was made just as the contract between the two companies for the sale of copper and other products was about to expire, it being thought best by the directors of the Amalgamated that the selling organization should be controlled and managed by the Amalgamated. The United Metals,

¹ *Comm. and Fin. Jour.*, 90:1426; 92:1559.

² *Moody's Analysis of Investments*, 1915, Pt. II, p. 1476.

³ *Copper Handbook*, X:1728.

⁴ *Comm. and Fin. Chron.*, 92:727.

⁵ *Ibid.*, 92:1559; 94:1564.

therefore, which was in the first instance formed by "Amalgamated people," had made a good share of its profits by refining and selling the products of Amalgamated mines, and had in eleven years paid out 210 per cent in dividends on its \$5,000,000 capitalization, was now sold to Amalgamated for \$12,050,000. We shall see later what further developments took place.

The Red Metal Mining Company meanwhile, all of whose stock was held by the Butte Coalition, and virtually all of whose assets consisted of 500,000 shares of Anaconda, was in 1911 dissolved, the Butte Coalition thereby becoming the owner of the Anaconda stock.¹ Among the other assets of the Coalition were a majority of the shares of the Alice Gold and Silver Mining Company and 3000 shares of International Smelting and Refining Company, which latter, in the words of President Cole, it had, in March, 1909, been "given the opportunity to subscribe for" at par. Since the assets of the Alice Company consisted at this time of 30,000 shares of Anaconda, the Butte Coalition would increase its holdings of the latter upon the dissolution of the Alice, a step already decided on but held up by litigation.² Butte Coalition, however, was dissolved later in 1911; and by this step, which involved the distribution of cash and 520,000 shares of Anaconda, Amalgamated received 26,000 more shares of its chief subsidiary, for its 50,000 shares of Coalition.³ The 3000 shares of International had presumably been sold and turned into cash and perhaps some Anaconda stock.

In this same year (1911) the Boston & Montana and the Butte & Boston were dissolved as part of the general scheme of dissolution of the companies whose properties the Anaconda had taken over.⁴ The Parrot

¹ Comm. and Fin. Chron., 92:1532.

² Ibid., 94:1564.

³ Ibid.

⁴ Ibid., 92:192.

also was to have been dissolved, but a suit in the Federal Courts, by two Boston stockholders, sought to set aside the sale of the Parrot Company's property on the ground of insufficient consideration and fraud, and thus delayed dissolution. The suit was decided in favor of the defendants in 1914.¹ Meanwhile the immediate winding up of the affairs of the company was impossible.²

The scene of operations then shifts to Arizona. Early in 1912 the Inspiration Consolidated Copper Company was formed to unite the Inspiration Copper Company and the Live Oak Copper Company, two large low-grade copper mines at Miami, Arizona.³ The exchange of securities was effected on the basis of one \$20 share of Inspiration Consolidated for two \$10 shares of Inspiration Copper, and two shares of Inspiration Consolidated for one \$10 share of Live Oak. On neither of the directorates of the two constituent companies had the Amalgamated group been represented. The new Consolidated company, however, included on its board Messrs. John D. Ryan, Thomas F. Cole, and William G. Rockefeller. In the first report of the Amalgamated which was issued after the consolidation, we find recorded the purchase of 150,000 shares of Inspiration.⁴ Further, in the next year, the International Smelting and Refining Company decided to build a smelter at the Inspiration property, in order to treat the concentrates of that concern (and, if possible, those of the neighboring Miami Copper Company and whatever other custom ores might be available).⁵

The International meanwhile had been expanding in other directions. In the report which he submitted to stockholders in 1911, President Ryan had remarked

¹ Comm. and Fin. Chron., 99:411.

² Ibid., 94:1564.

³ Ibid., 94:128.

⁴ Ibid., 96:1420.

⁵ Ibid., 96:1736. *HO*

that some lead-smelting furnaces were necessary at the Tooele (Utah) smelter, and that a lead refinery was to be installed at Perth Amboy, N. J., the location of the Raritan Works.¹ The lead smelter was constructed and the first furnace blown in on July 29, 1912.² The plan for the refinery at Perth Amboy, however, was abandoned. Instead, the International Lead Refining Company was incorporated in Indiana and a refinery site purchased at East Chicago, the stock being subscribed for by the parent company. The refinery constructed there was said to be the largest in the world.³ In the meantime, Perth Amboy had not been neglected; for the capacity of the Raritan copper refinery was greatly increased.⁴

All this required money. The International announced in fact, in April, 1914, that it had incurred an indebtedness of about \$9,000,000, to which would have to be added some \$2,500,000 for the completion of the smelter at Miami.⁵ The "Seven-Sister" legislation of New Jersey, further, had, the company said, put certain restrictions on its powers in regard to holdings of securities of other companies which might in the future need to be organized. The time was said not to be favorable for financing the company's needs by means of stock issues. A meeting was therefore called for May 26, 1914, at which stockholders were to be asked to vote on a dissolution of the company and a sale of the entire property to the Anaconda. It was stated that the latter corporation had offered to purchase the property, business, and good-will of the International, assume all debts, liabilities, and contracts, meet all expenses of transfer, and pay something over \$10,000,000. An

¹ *Comm. and Fin. Chron.*, 92:1559.

² *Ibid.*, 94:1564.

³ *Ibid.*, 98:1319.

⁴ *Ibid.*, 96:1457.

⁵ *Ibid.*

exchange of stock, for those who wished to make it, would be made on the basis of 3.3 shares of Anaconda (\$82.50 par, in total) for one share of International (\$100 par).

The proposals of sale and dissolution were duly approved by the stockholders.¹ As a result, Anaconda became possessed of two copper smelters (one in process of construction), a lead smelter, the shares of a lead refinery, and those of a copper refinery. Amalgamated meanwhile owned the shares of the United Metals Selling Company which had formerly owned the shares of the copper refinery and still sold its product, and which had been the owner of 43,000 shares of International,² now converted into 141,990 shares of Anaconda. Immediately there was organized, in May, 1914, under the laws of Montana, the International Smelting Company, which took over the properties at Tooele and Miami, issuing therefor \$15,000,000 capital stock, all of which was held by the Anaconda.³ The latter continued to hold directly the shares of the Raritan Copper Works and those of the International Lead Refining Company as well as those of the Tooele Valley Railway Company and the Raritan Terminal and Transportation Company.

The next episode was the issue by the Anaconda, early in 1915, of \$16,000,000 2-year 5 per cent notes.⁴ Part of the proceeds of this issue was to be spent on improvements.⁵ The rest was to go to the Amalgamated and to the United Metals. For \$4,769,900 there was acquired from the Amalgamated 150,000 shares of Inspiration

¹ Comm. and Fin. Chron., 98:1762.

² Of these, 40,000 had been acquired by the sale of the Raritan Works (Copper Handbook, X:1728); the other 3000 had been bought later (Comm. and Fin. Chron., 94:1564).

³ Ibid., 99:896.

⁴ Ibid., 100:735. The Amalgamated notes of 1911 had been renewed in 1913. Poor's Manual of Industrials, 1915, p. 1725.

⁵ Ibid., p. 1081.

Consolidated, 30,800 shares of Greene-Cananea Copper Company,¹ and 1110 shares of Mountain Trading Company, besides small blocks of other stocks. For about \$6,000,000 the United Metals assigned and transferred to the Anaconda all its assets, business, and good-will, except for its 141,990 shares of Anaconda and the stock of metals owned by it. These were turned over to Amalgamated and the company dissolved. There was incorporated at once the United Metals Selling Company of Delaware, with a capitalization of \$5,000,000, to which were transferred such of the assets acquired from the old New Jersey company as were necessary for the conduct of its business; in return for which the Anaconda received its whole stock issue. The Anaconda — the operating company, owner of mines, smelters, and refineries — thereby came into possession of its own selling organization, instead of this being in the hands of the holding company, the Amalgamated.

The final step was taken on June 7, 1915, when Amalgamated shareholders voted to dissolve the company. When the directors, sixteen years almost to a day after the formation of the company, announced the plan of dissolution, they stated that the company's holdings of Anaconda amounted to 3,327,937 shares (out of the 4,662,500 shares then outstanding).² Anaconda was at the time selling on the market for about \$35 a share; Amalgamated for \$75.³ The directors offered to the Amalgamated shareholders the right to buy Anaconda stock from their own company at \$25 a share, in the ratio of one share of Anaconda for each six shares of Amalgamated held by them. This would yield the wherewithal to pay off a small floating debt — about \$800,000 — of

¹ Amalgamated had reported ownership of 100,000 shares of this stock in 1910 and had bought 54,000 shares in 1912 (*C. and F. C.*, 94:1564); it must, therefore, have sold a considerable block of it.

² *Comm. and Fin. Chron.*, 100:1594. ³ *New York Evening Post*.

the Amalgamated, and enable the distribution of \$50 of Anaconda stock and about \$3 cash for each share of Amalgamated held. Meanwhile the Anaconda shareholders were asked to vote and did vote, to double the par value of the stock and to halve the number of shares.¹ Amalgamated shareholders therefore received one share of Anaconda for each share of Amalgamated surrendered. Following the vote of dissolution, John D. Ryan, who had been president of the Anaconda before he became head of the Amalgamated, assumed again the presidency of the operating company.²

Mr. Ryan, in a sort of valedictory, remarked that since its incorporation Amalgamated had earned profits of \$113,032,300, of which \$91,279,147 had been paid in dividends and \$21,551,964 invested in securities later exchanged for Anaconda. These dividends represent payments on an 8 per cent basis (on its original capitalization of \$75,000,000), up to the time when Boston & Montana and Butte & Boston were absorbed, and an average of something under 4 per cent for the fourteen succeeding years.³ Anaconda had meanwhile averaged about 11 per cent from 1900 to 1910, when its capitalization was increased, and slightly below 10 per cent from that time to the end of 1914.⁴ In April, 1915, Amalgamated, with a capitalization of \$153,887,900, held about \$78,000,000 of Anaconda, which would yield just about 5 per cent on the shares of the former if Anaconda dividends continued to average about 10 per cent.

The Amalgamated dividend rate was a variable quantity. Steadiness was apparent chiefly when it was 2 per cent a year. Beginning its history with quarterly

¹ *Comm. and Fin. Chron.*, 100:1734. ² *Ibid.*, p. 2012.

³ Dividend rates in *Poor's Manual of Industrials*, 1915, p. 1737.

⁴ Rates given in *Poor's Manual of Industrials*, 1915, p. 1734.

payments of $1\frac{1}{2}$ per cent and $\frac{1}{2}$ per cent extra, the company continued these well into 1901, when it first dropped the "extra" payment. In 1902, only $2\frac{1}{2}$ per cent was paid for the year; in 1903 and 1904, 2 per cent each year. The rate rose during the "boom" period of 1905-1907, so that during 1907 7 per cent was paid. Then for over four full years, a flat 2 per cent rate prevailed. In the second quarter of 1912 the rate began to rise, and in 1913, the last full normal year in the copper industry, it was 6 per cent.¹ How much of the company's profits, or what losses, if any, came from trading in stocks — exemplified by its dealings in Greene Cananea — we do not of course know.

Shareholders of Amalgamated, on surrendering their stock for Anaconda, received an equity in a really remarkable property, with an organization of high quality. More and more Anaconda is standing for productive and selling efficiency and for the most advanced technical skill. When the Amalgamated was formed it represented a certain degree of integration, both within the constituent companies themselves and through the consolidation under one control of copper companies, coal properties,² a lumber company, and a railroad.³ Anaconda has developed into a well integrated concern; representing indeed almost the maximum of integration to be found in the American copper industry. Horizontal combination has also grown. Such of it as there was in 1899 was within one small tho rich mining camp; whereas the Anaconda of April, 1915, combined

¹ Poor, *Manual of Industrials*, 1915, p. 1727. *Comm. and Fin. Chron.*, 94:1121. The six per cent rate was maintained in 1914 until the last quarter, when a quarterly dividend of one-half per cent (or two per cent a year) was declared.

² Not only was there the Diamond Coal & Coke Co., and the Big Blackfoot, but the Washoe owned some valuable coal and timber land. See Poor, *Manual of Industrials*, 1915, pp. 1731, 1732.

³ The Butte, Anaconda & Pacific, running from Butte to Anaconda, with some branches. The Anaconda always held a large interest in this and now owns its entire capital stock and funded debt. See Poor, *ibid.*, p. 1732.

copper and other properties in Montana, Utah, Arizona, and New Jersey (besides interests in Chile). The Amalgamated was never more than a holding company; Anaconda, always an operating company, is also a holding company, with a tendency to get increasingly direct control of the integrated parts of its business, instead of relying on mere community of interest. How early the deliberate plan of gradual transfer of power from Amalgamated to Anaconda was conceived, it is impossible to say. It is clear that it was hastened by the levying of the Federal corporation income tax,¹ which, under a holding-company régime, resulted in double taxing of profits, and probably by the New Jersey "Seven-Sister" legislation.

What degree of "amalgamation" was in the minds of those who fathered the Amalgamated Copper Company and gave it its name? Before the company was actually formed, all sorts of rumors were current about a huge "copper trust" that was in the making, including one report of a \$400,000,000 corporation. In 1909 it was again bruited about that a big combination in the industry was to be launched. The Standard Oil and Tobacco decisions seem to have discouraged any plans that may have been made at that time. Amalgamated never held anything like a monopoly of copper production in this country.² Never did the mining companies in which it had a controlling interest produce more than about 300 million pounds of copper a year; in 1899 and 1900 its subsidiaries produced only about 130 millions. Meanwhile the total production of copper in the United States, from domestic ores, has grown from about 570

¹ Comm. and Fin. Chron., 100:1594.

² All the figures that follow are necessarily rough, from lack of definite, reliable statistical information. (This of course does not include the figures for production in the United States, which are taken from Mineral Resources of the United States, 1914, Pt. I: 545.)

million pounds in 1899 to about 1200 millions in each of the last three years. The United Metals Company, it is true, sold and in so far controlled a very large share of American production. Beginning with sales of perhaps 300 million pounds a year, or fully half of our domestic output, it increased its sales until at one time it sold probably over half of the total product of American smelters, from both domestic and foreign ores. But this company, it must be remembered, was for over ten years under the control not of Amalgamated as such, but of Amalgamated interests. Today, moreover, the Guggenheims, not the United Metals, are the largest single factor in copper distribution in the world.¹ United Metals controls perhaps less than 40 per cent of the copper production of North America. No monopolistic situation, therefore, to repeat, resulted from the formation of Amalgamated.

The whole story that has just been sketched forms, as was said at the beginning, an interesting chapter in corporate organization. It has had to be told after the manner of a novel with a complicated plot; and it ends, as a novel should, with the "situations" cleared up (as of June 7, 1915) and with a proper sense of finality left in the reader's mind. To change the figure, after a great deal of scrambling, the necessary amount of unscrambling followed in due time. Perhaps the narrative throws some light on the direction of corporate evolution in this country, in the lessening of the importance of holding companies, especially of those that are holding companies merely. With the passing away of Amalgamated, after its sixteen eventful years of existence, there is in the whole copper industry of the United States only one instance of a really important holding company that is

¹ Private information. United Metals probably still sells more copper from strictly domestic sources than any other concern, but no longer more than half our output.

not also in some measure an operating company. That is Phelps, Dodge & Company, the corporation which in 1908 succeeded the old firm of the same name. Even this corporation "operates" to the extent of selling the copper of its subsidiaries and of other copper companies. The Phelps, Dodge interests, further, seem generally to have shown a distinctly separatist tendency in their activities. There has never been a United States Steel Corporation, or anything approaching it, in the copper industry. One may hazard a guess that there never will be.

F. ERNEST RICHTER.

HARVARD UNIVERSITY.

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